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ABSTRACT

This is the third (1976) compilation of papers presented at the annual meeting of the National Association for Environmental Education. The 23 selected papers are organized into four categories: Keynote Speeches; Environmental Education: Programs, Methods, and Materials; General Topic: Environmental Education; and Energy Conservation. The reports provide current information on the status of environmental education, suggestions for the future, and suggestions for instructional activities. (RH)

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CURRENT ISSUES IN ENVIRONMENTAL EDUCATION—II

Selected Papers From the Fifth Annual Conference of the National Association for Environmental Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger
Associate Director
Environmental Education

Sponsored by the Educational Resources Information Center of the National Institute of Education and The Ohio State University.

This publication was prepared pursuant to a contract with the National Institute of Education, with the cooperation of the National Association for Environmental Education. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official National Institute of Education position or policy.

FOREWORD

The 1976 conference of the National Association for Environmental Education again attracted some of the most talented and interested laborers in the field of environmental education found in North America. The spectrum of participant interest extended from those interested in education's role in national land use to those interested in how a schoolyard can be made to enhance environmental awareness. Interest and idea sharing also ranged from contemporary values and value change to such topics as history and communication's role in environmental education.

The substance of the papers presented at any given conference cannot be all things to all people, but the substance of environmental education involves all things and all people. The papers presented in Current Issues in Environmental Education II do not leave all stones unturned, but they do represent a wide range of substantive issues.

This is the second in a series of annual publications utilizing papers presented at NAEE conferences. As the association grows, qualitatively and quantitatively, so do the quality of the papers presented and their national perspective. Though all the papers submitted could not be included in this publication because of space limitations, all contributions were appreciated, and many will be available through ERIC.

The Association wishes to recognize Robert Roth's expertise and dedication made manifest in the quality of the 1976 program and its effect on Current Issues. Also, the continued and dependable work of Bonnie and Robert McCabe make this publication, as well as many other NAEE publications, possible--obviously, a labor of love. Heartfelt appreciation from the Association goes to the ERIC Center for Science, Mathematics and Environmental Education for sponsoring this publication, and to John Disinger for his irreplaceable assistance.

Robert Marlett
Editor

September 1976

THE FIFTH ANNUAL CONFERENCE
of
THE NATIONAL ASSOCIATION FOR ENVIRONMENTAL EDUCATION

The Fifth Annual Conference of the National Association for Environmental Education was held at the Sheraton-Biltmore Hotel in Atlanta, Georgia, April 25-27, 1976. The conference theme was "New Values for a New Century." Dr. Beatrice E. Williard, Member, Council on Environmental Quality, Washington, D.C., keynoted the opening of the conference with an address on natural principles and values in relation to economic and ecological challenges in environmental management and thought. The closing keynote address, with the helpful sponsorship of ERIC/SMEAC, was given by Dr. Roderick Nash, Director, Environmental Studies Program, University of California, Santa Barbara, California, on the future and history of environmental education.

Individuals in attendance were from thirty-seven states, two Canadian provinces and the District of Columbia. Approximately fifty-four presentations were made, including research presentations, seminars, project reports, and methodological descriptions in three categories: education, issues, and agencies/organizations. Program and activity presentations were included in a poster session in walk in-walk out format. Six workshops ranging from materials to curriculum design were also given. Environmental education materials, exhibits, field trips to several sites, a Board of Directors meeting, three concurrent group meetings, and a business meeting were included in the conference.

The 1976 conference can be characterized as a well-attended conference with quality presentations that elicited enthusiastic participation and expanded membership in NAEE. The papers included in this volume were selected from among those presented at the conference and are presented to the reader as a means of fostering continued dialogue and thoughtful discussion on a variety of subjects directed toward improved environmental education for people of all ages. Papers not selected for this presentation are available through the Educational REsources Information Center (ERIC), in a separate compilation.

The success of the conference was due to the hard work and dedicated support of the NAEE Executive Committee, the 1976 Program Committee, the presentors and participants. Special thanks are in order for Bonnie and Bob McCabe for the special attention to detail and support services in the NAEE office and Atlanta, and the Coca-Cola Company-Atlanta for furnishing the beverages for the Hospitality Suite.

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KEYNOTE

1

NATURAL PRINCIPLES AND VALUES FOR A NEW CENTURY

Beatrice E. Willard, Ph.D.
Member
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Washington, D.C.

I. Introduction

I congratulate this Association on its choice of theme, "New Values for a New Century" for this conference in our nation's Bicentennial Year. It is fitting that we scrutinize what we are about as we enter a new century. In thinking about the theme, it occurred to me that perhaps we are not really seeking new values per se, but global principles and values that have stood the test of time, space, and the winnowing processes of much use in diverse situations -- i.e., old principles and values in new format and new context.

As environmentalists, we are concerned with a highly diverse, complex, and sometimes controversial segment of human knowledge -- spanning many disciplines and professions. As educators, we are concerned with orchestrating learning and understanding of both cognitive and effective human information. In both roles, we are concerned with the fundamental forces in human life that can be channeled to bring about constructive change and unfoldment for civilization. In these roles, we as people are continually seeking to implement those basic principles and organizational frameworks that will enable us and our students to be more effective throughout life. For example, we teach basic mathematical principles, basic language principles and concepts, basic behavioral and economic principles and concepts, etc., so that the upcoming generations will be prepared adequately to cope with and improve life, and to make intelligent decisions about how to live it to the utmost, with low risk. We teach principles and concepts so that the "rules of life's game" will be transmitted effectively to people. We also teach numerous specific details that have embellished the pageant of people through time and have made a difference to what happens in history. We often use these details as positive and negative illustrations of what can happen when principles are put into practice.

Environment also has a body of principles and concepts that undergird its operation. Some are shared with the physical, biological, and social sciences from which it must draw heavily. Some are unique to environment.

At this juncture, let me share with you an experience of an eminent geologist who I knew at the University of California at Los Angeles, as an example of how, until recently, the majority of society has tended to regard principles and concepts of environment.

This man had studied the surficial geology of the Mono Basin of Eastern California for years. He had aged its moraines, its shorelines, its volcanic features. He had studied in detail the processes by which each was made. He became aware that the engineers at the Los Angeles Metropolitan Water and Power District planned to route an aqueduct from the Basin through the Mono Craters, which had erupted within the previous 2,000 years. So he went to the engineers and explained his scientific findings. He was told summarily that they were not interested in his findings, and that they intended to go ahead as planned, in

spite of the fact that an easy route around the Craters existed. And they did go ahead with the tunnel. Within a few months they literally were in hot water inside the Mono Craters (luckily it was not hot magma!). This part of the project had to undergo major redesign. The oversight cost the project three-years delay, untold thousands to millions of dollars, and numerous man-years of work.

We may say, "Well, that was forty years ago," but in the 1960's a similar thing happened in design and construction of Interstate 70, west of Denver, where the engineers failed to heed the geologists who pointed out that Straight Creek Tunnel was routed directly through a major fault in the Central Divide. The scientists counseled the engineers to move north or south a few hundred yards so as to avoid this zone of mountain movement. But the engineers did not think it necessary to do this. Several years and tens of millions of dollars were expended needlessly because of this refusal to accept facts about the operation of natural principles and forces in the human environment. A new innovative tunneling machine was literally squashed by the sheer forces encountered, and finally had to be completely tunneled through!

I use these examples, not to breed fear, caution, and dissension in us here, but to catalyze health, active respect for natural principles and their operation. When we move in rhythm with these principles, they work for us. Today the great challenge is no longer "how much of Earth's forces can we overcome," but "how can we best harmonize necessary human activities with the dynamics and processes of Earth's ecosystems, making the least alteration to these systems, so as to foster the well-being of all mankind, together with the ecosystems of Earth for generations to come." This is not to say we cannot or should not devise means for extending human capabilities where needed. But it is to say we need to accept and apply the attitudes and techniques outlined in our National Environmental Policy Act of 1969.

I would like to share a third example from my own experience, not because of pride, but because it illustrates several major points in regard to environmental education. Some years ago, when I was teaching high school biology in Northern California, I opened a semester by outlining what we planned to study to a particularly fine class with which I had developed an excellent rapport. I said, "We are going to study adaptation to environment, balance in nature, and conservation." When I said the word "conservation", the class groaned and fell apart, which shocked me. In analyzing their incomprehensible reaction, I realized that they had been taught "conservation" as a series of "do's and don'ts" with little explanation of the why's. These intelligent, innovative young people reacted against doctrine of any type presented without the rationale behind it. I went ahead and taught them six weeks of "conservation", leading them to perceive natural principles as they were operating in local nearby ecosystems. We studied together why the 17,000 head interstate deer herd had experienced a severe starvation the previous winter, what happens after fire clearcut, with severe predator control, draining of lakes to form grain fields, and other local phenomena. Their understanding of local situations in light of natural principles developed and matured to the point where they supported the Fish and Game Commission's recommendation for a doe hunt on the deer herd, in spite of parental opposition to it.

Results of this experience were amplified when I taught classes that qualified as "conservation education" for teachers in Colorado and when designing and managing seminars for top-level national policy and decision-makers in Aspen. As the principles, concepts, and processes of ecosystems were demonstrated in the field setting to these people, their meaning and application to human

activities in management of ecosystems germinated and unfolded in their thought, and took form in changed actions. Ecosystem principles were incorporated into the criteria for engineering designs, into agency and corporate decisions, and into environmental education projects. With this integration of global principles into human activities, those activities were brought into greater harmony with their environment -- a satisfying enterprise for the doers.

II. Some Natural Principles of Environment, their Meaning and Application

I would like to describe several ecosystem principles, discuss their meaning to the world, today and tomorrow, and examine a few of the many applications these principles have to environmental education. But first, I want to define ecology and environment -- not because I think you are ignorant, but because I find so many different definitions of these essential terms being used.

Ecology is the science that studies ecosystems -- those recognizable discrete, homogeneous units of the landscape composed of organisms, physical/chemical environment factors, and the numerous interactions that go on between and among organisms themselves and with their environment. This science studies systems, therefore, focuses on dynamics and on processes. Also, since human beings are organisms, they function as part of these systems.

Environment has both a broad and narrow meaning. Its broad definition of "everything around an organism" is fine; its narrow meaning referring to the complex of physical and chemical factors in ecosystems makes a workable entity. The amalgam of factors that are extensions of human beings -- culture, social interaction, economics, politics, etc. -- is also part of the system because humans are.

Interrelationships

The ecological principle of primary importance is that everything on Earth is connected to and affects everything else, directly or indirectly. Nothing operates in isolation. This principle operates in spite of the fact our senses tell us otherwise. A prime example of this principle in operation is the fact that DDT and radionuclides have been found in the tissues of all organisms tested to date, even in flightless Antarctic penguins. Since penguins must obtain these substances from outside the Antarctic Continent, for none of either substance has been introduced directly to that continent by humans, it is obvious that these substances have traveled to penguins through a series of links in their food chain.

Ecosystems and Niches

Earth is covered with a vast array of discrete homogeneous landscape units -- deciduous forests, grasslands, etc., large and small, which interact with each other. These landscape units are called ecosystems. The composite of them makes up the ecosphere. Ecosystems have three interactive components; organisms, including humans and all their accoutrements; environment factors, climate, topography, rocks, soil, water; and the dynamic processes -- interactions -- that go on among and between organisms and environment factors. Because they are systems, nothing on Earth can exist apart from them -- even if it believes it does and tries to behave as though it does.

Within these systems, each type of organism has a role to play -- a "niche". To man, these roles of other organisms are sometimes obscure, negligible, or detrimental. Ecological research demonstrates that such organisms are nevertheless significant in the total functioning of ecosystems.

A prime example is a cypress swamp bordering the Savannah River near here, between the nuclear plant and the river, which was considered negligible in usefulness to man until recently. Research of the material flow pattern in that swamp showed that, under the specific conditions prevailing (a long undisturbed system with water pH 7), kaolinite of the oil was absorbing all the ^{37}Cs being released by the plant, therefore, radioactive cesium did not reach the river. But, when the pH level of the water was changed slightly by adding small quantities of nearby well water, cesium was released from the kaolinite into swamp water and eventually into the river.

Material Cycling and Energy Flow

Chemical substances in ecosystems cycle and recycle through and among systems at varying rates. For this reason, they are available for re-use in geologic or shorter time. Humans can speed up cycling by planning. Conversely, a highly significant contrast exists with energy. It follows a one-way downhill flow path, somethings circuitous, always eventually dissipating as heat, thus losing ability to do work. Nearly all energy used on Earth comes from the Sun. This infusion of energy also creates Earth's climate.

Limiting Factors

Within all ecosystems, specific features of the environment interact with the genetically-controlled nature of the organisms to restrict or limit the functioning of these organisms. These interactions define the operating parameters of that system and the organisms within it. Frequently, a constellation of physical and chemical factors interact with a group of species to describe the limiting factors of the system. For example, the Gulf of Mexico upslope snowstorms limit deciduous trees in the natural ecosystems of the high plains by depositing heavy snow and ice along the east base of the Rocky Mountains during late spring and early fall when deciduous trees usually still have their leaves. The snow is trapped by the leaves and branches until an intolerable load is released by massive breaking of the branches. Only a few species can tolerate repeated storms of this type. Humans expand limiting factors and adapt to them readily, so accept degradation readily.

Populations

Species have the ability to reproduce far in excess of the capacity of ecosystems to support them. This reproduction capacity varies from species to species. Population levels result from interactions among populations of species and from influences of physical environment factors on populations. As ecosystems develop, these interactions continue to fluctuate until a dynamic equilibrium is reached. If some ecosystem components are changed, they will influence the levels of others.

For example, the deer herd I mentioned earlier had been in dynamic equilibrium with the numerous components of its ecosystem when white man altered the system in a variety of ways. These changes enabled the herd to increase in numbers at a rate of about 25 percent per year. The added animals ate more forage and expanded their range, until they had reached the limits of the ecosystem. Then a large proportion of the herd starved to death, leaving an altered ecosystem behind that was less capable of sustaining them.

Carrying Capacity

Over time, the constellation of limiting environment factors and gene composition

of organisms interact to produce a dynamic optimum operating budget in an ecosystem that the ecologists call the ecosystem's "carrying capacity". This principle also operates in engineering systems; transmission systems are designed to carry a given electrical load; computers are designed to carry a given information load; bridges with girders are designed to withstand certain forces. Engineers are familiar with what happens to these latter systems, if these loads are exceeded. They cease to function properly or productively. So it is with ecosystems, but, because they are living, they have a bit more built-in dynamic resilience. However, living systems may not indicate that the carrying capacity has been exceeded until the actual point is well past in time, numbers, and balance. We need to design their management so that room for error is provided.

Ecosystem Development

Over geologic time, ecosystems develop from especially simple systems on biologically naked surfaces of rock, sand, or water, through progressively more complex systems that each change the nature of the system until a stable mature highly complex system is reached that is permanent unless catastrophic change occurs. Natural processes exist for healing various naturally occurring ecosystem disruptions, such as fire, landslide, insect infestations. These processes are generally slow, but sure. They also can heal perturbations introduced by man, especially when the perturbations are introduced in a manner that complements or is integrated with existing processes. But if processes are introduced that are diametric to existing ecosystem processes, they can be as toxic to ecosystem operation as cyanide to the human system.

Specialization

As ecosystems develop, the physical and biological conditions change, increasing the opportunities for new species to invade. Ecosystem development processes result in increased numbers of species inhabiting a system, and absorbing the existing ecological roles (niches). Competition for air, water, food, and space brings increase in specialization, creating added niches. Over time, genetic changes occur and recur, augmenting and/or decreasing the ability of some species to compete. These processes bring changes to species which further change ecosystems.

Diversity, Maturity and Stability

As ecosystem development and species specialization occur, they increase species diversity. As in economic and social systems, diversity creates stability by buffering the influence of any single perturbation in the system. Therefore, the simpler the system, the more responsive to and far-reaching the perturbation; the more diverse the system, the less responsive to perturbation. One can see an example of this in 1972-73 winter's experiences with ice storms in the southeast. Natural forests sustained breakage proportional to their inclusion of trees that had brittle wood. Thus, plantations of long-leaf pines sustained the greatest damage, because of their brittle wood, coupled with long needles that held considerable ice and their homogenity of species.

III. Implications of Ecosystem Principles for Environmental Education

At this point, someone may feel like challenging me with "But you are prejudiced; as an ecologist you are trying to make us all into biological scientists by advocating the use of the science of ecology as the integrating mechanism -- the umbrella -- for environmental education or for environmental management, etc."

It may appear that I am trying to do this, if we overlook three facts: (1) ecosystems and their attendant principles exist and operate everywhere on earth; (2) humans are integral components of many global ecosystems and transient components of all others; (3) humans, as a species, do have a wide variety of psychological, cultural, and historic outgrowths -- political, social, and economic institutions, organizations, bodies of knowledge, philosophic and religious ideas, ad infinitum -- but all of these outgrowths are also part and parcel of Earth's ecosystems, because humans live in, depend on, are affected by, and affect Earth's ecosystems. This is true in spite of human attempts to isolate themselves physically and conceptually.

It is solely because of this triad of interdigitating facts that I advocate the use of ecology -- the science of the life support system -- as the unifying discipline for all environmental matters, and especially for environmental education. Since ecological science interfaces and incorporates with other sciences of necessity (from its inception -- with geology, hydrology, climatology, pedology, physiology, anatomy, anthropology -- and more recently with economics, psychology, sociology, political science, architecture, engineering, cybernetics, and others) today it assumes a logical coordinating, synthesizing role in the world of tomorrow.

How then can we most effectively use ecology? It is especially important to understand one fact in all use of ecological principles, i.e., that the most complex system created by man (you choose the system) is simple by comparison to the simplest living system -- the single cell. And when cell systems are compounded to make tissues, organs, and organisms, then further form various terrestrial and marine ecosystems, the complexity differs from and is greater than in man-made systems by at least one order, if not several orders.

Furthermore, humans tend to look for single clear-cut causes to explain all types of occurrences, including environmental phenomena and problems. Seldom is there a single causal factor in ecosystems; usually there are several factors interacting synergistically.

Those who seek to enhance learning about environment are facilitators for developing people's skills in conceptualizing these two facts; i.e., facilitators of their "thinking ecologically". This means assisting people to think in five dimensions at once -- time and biological development included. Thinking ecologically means assisting people to think wholistically. It means leading people to realize that it is important to analyze facets of a system -- air pollution, solid waste, etc. -- but they must be enabled to make analyses with the system and its characteristics fully in mind, and to integrate what they find back into the whole.

Wholistic ecological thinking means providing ample opportunities for first-hand, intensive, and repeated experiences in various ecosystems under the wide range of conditions that they operate -- summer, winter, fall and spring; rain and shine; disturbed and pristine, over time.

Ecological thinking is greatly facilitated by using the time-honored Socratic Method of instructing by adroit questions and other techniques designed to force the learner to observe, experiement, gather data, analyze, synthesize and interpret results for oneself, rather than have information poured on like hot fudge.

Wholistic ecological thinking means recognizing that knowledge of the environment draws from a wide range of disciplines, therefore, the most effective

research and analyses are accomplished by interdisciplinary (not just multi-disciplinary) team approaches. This fact leads to developing more Renaissance thinkers, who have a broad knowledge and understanding ranging over the full scale of human activity and learning. Such breadth and depth will enable them to appreciate and to be able to work effectively with people skilled in diverse disciplines on interdisciplinary teams. It means appreciating the roles of all the various constructive characteristics and segments of society, even if they are quite different from one's own.

Education to understand ecosystem principles and think wholistically about them also includes facilitating the ability of learners to discern significant differences among ecosystems. It assists learners in interpreting meaning of ecosystem processes and their values to man.

IV. Conclusions

Interestingly, the terms "ecology" and "economics" are derived from the same Greek root -- "oilos" -- meaning "home" or "habitat". In ancient Greek, these two terms were used interchangeably, implying recognition of integral relationship between them. For us today, I think this integral relationship can function again by using ecosystem principles in management of all ecosystems from individual human surroundings to the ecosphere. Such integrated, wholistic management is a necessary precursor of continued healthy well-being of the human species on Earth.

You people in this National Environmental Education Association, we all as "environmental professionals", have a wonderful array of challenges and opportunities in the new century -- the third of our nation, three thousandth for modern man on Earth. The opportunity is ripe for developing and enhancing an ever-deepening sense of "kinship with" and "reverence for" all life. The potential is tremendous for such attitude development so as to assist human beings in solving some pressing problems about harmonizing their activities with Earth's ecosystems. We are challenged on every side to facilitate understanding that leads logically to developing an ethic of accountability for human actions in ecosystems -- the "land ethic" of Aldo Leopold and "ecological conscience" of Paul Sears. Without this attitude deeply planted in human beings and without practice of the ethic of accountability, environmental concerns and education about them tend to remain superficial -- even cosmetic.

Practice of this ethic is well summarized in two quotes by earlier "environmental professionals":

> Aldo Leopold asked in 1945, "When is man going to realize that land is a community to which he belongs, rather than treating it as a commodity he can exploit?"
>
> Rachel Carson pondered in 1962, "I truly believe that we in this generation must come to terms with nature, and I think we are challenged as mankind has never been challenged before, to prove our maturity and mastery, not of nature but of ourselves."

All of us here have a great challenge to practice our profession in such a way as to assist all humans in living up to the National Environmental Policy Act -- "in creating and maintaining conditions under which man and nature can exist in productive harmony" -- by "maturity and mastery of ourselves" in increasingly excellent wholistic ecological thinking and teaching. In this way we can truly demonstrate both our professionalism and our utility to Earth's ecosystems and man alike.

LOGS, UNIVERSITIES AND THE ENVIRONMENTAL EDUCATION COMPROMISE*

Professor Roderick Nash
History and Environmental Studies
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At an alumni banquet in 1871, the future President of the United States, James A. Garfield, wished to honor the legendary leader of Williams College, Mark Hopkins. "The ideal college," Garfield declared, "is Mark Hopkins on one end of a log and a student on the other."** Garfield's remark illustrates the integrated concept of education embodied in the 19th century liberal arts curriculum of America's schools and colleges. For the student facing him on Garfield's metaphorical log, Mark Hopkins was the college. Like a bee with pollen, his mind collected knowledge, digested it, related it and spread it before his pupils. Since Hopkins was not a specialist, and since the object of his instruction was to produce what the 19th century called a "well-rounded" individual, the aim of his teaching could not help but be integrated, general education.

This, of course, was the goal of the classic liberal arts curriculum that Williams and the other colleges of the early 19th century featured. The point of going to college--and the same could be said of preparatory schools of the time--was to develop the broad catholic outlook characteristic of a learned individual. Inspired by the English universities, especially Oxford and Cambridge, America's early colleges were not vocationally oriented. Their purpose was to train minds and build character, not to teach specific skills or bodies of specialized knowledge. One studied mathematics, for example, to learn how to reason logically, not to become a mathematician. One read literary classics to refine taste and acquire wisdom. Nobody at that time expected a 500 page dissertation on the significance of the bow of Odysseus.

The product of this educational program might best be styled a "gentleman" (and before 1865 when Vassar opened its doors almost all college students were men). He was articulate in writing and in speaking, and was comfortable in at least one foreign language. He was at home in the world of quantity and measurement, but his flexible mind also appreciated beauty in form, sound and color. He knew a good deal about the world of nature, but also about the world of man. Firm of conviction and clear in his values, the liberally educated man did not hesitate to apply his learning to the problems of his society. Indeed a society of broadly educated citizens, in the Jeffersonian mold, was a primary goal of this 19th century educational endeavor. Such persons could make the reasoned decisions on which the successful future of the republic depended.

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**Frederick Rudolph, The American College and University: A History. (New York, 1962), p. 243.

Doesn't that composite of the well-rounded college graduate of say, the 1830s, resemble quite remarkably what we today refer to as an "environmentally literate" individual? So what happened? Why is Environmental Education currently a reforming influence trying to get a foot in the door of the American house of learning instead of being its most honored guest? The answer, quite clearly, is that educational ideals changed after the Civil War. The cause of the change was the influence of the Germanic university.

In sharp contrast to the liberal arts colleges, the universities that rose in the United States in the last third of the 19th century adopted a fragmented or reductionist approach to education. Their method was to reduce the pie of knowledge to ever narrower slices and to probe to unprecedented depths beneath the crust. "Research" became the new academic god, its object was the extension of knowledge, and its hallmark was the Ph.D.

Undeniably, the Germanic model of education was enormously exciting. Knowledge was not just being transmitted from one end of the Mark Hopkins' log to the other, it was being created. When Dartmouth-graduate George Ticknor traveled to Germany in 1815 he was astonished to find professors at the University of Göttingen working eighteen-hour days in the library and laboratory. The Mr. Chips image of a teacher was totally shattered for Ticknor forever. He remained in Europe to become the first American to receive a Ph.D. and, in 1819, returned to a professorship at Harvard. Ticknor tried to reorient Harvard's liberal arts curriculum toward the Germanic mode, but he remained a prophet without much honor given prevailing educational assumptions in the United States.

There were, of course, excellent reasons for American education to hitch itself to the German academic star. Knowledge was proliferating at a breathtaking rate. Those who did not specialize increasingly found themselves without anything significant to say about complex subjects. A single mind, even that of Mark Hopkins', could not possibly contain everything society needed to know. Progress depended on specialization. This was the message emanating from Gottingen, Bonn, Berlin, Leipzig, Paris and the other European centers of higher learning.

One of the first American educators to see the writing on the academic wall was Charles W. Eliot whose long tenure as president of Harvard began in 1869. Eliot was the prime mover in transforming Harvard from a college into a bona fide university. His tool was the "elective system". Under Eliot's program, Harvard undergraduates no longer had to take the prescribed curriculum considered essential for a well-rounded education. Instead, they could pick and choose from a widening array of increasingly specialized offerings. They could, as the new term put it, "major" in a discipline. Other subjects were excluded from their degree requirements.

The impact of Charles W. Eliot and the "elective system" on Harvard were striking. When Eliot's term as president began, the institution had only sixty faculty members. Forty years later the sixty had increased to six hundred! The division of knowledge into finer and finer specializations required more and more specialists. The advent of "departments" and their mitosis into more departments is another way to gauge the change the university ideal brought. In the old-time college there had been no academic departments. A professor simply was a faculty member of the college; the new ordering saw the sciences veer sharply from the humanities. Both stood apart from the social studies. Departmentalization occurred within these academic territories. And the process of division and separation continued. In the case of the University of Chicago,

the Department of Biology became five departments: Zoology, Botany, Anatomy, Neurology and Physiology. This, of course, meant five new chairmen, five more professorial hierarchies and the intensification of competitive academic territorality. Other fields experienced the same mitosis. Departments of Political Economy became Departments of History, Departments of Political Science, Departments of Economics and Departments of Anthropology. Departments of Language became Departments of German, Departments of French, Departments of Spanish. Even within the proliferating departments, specialization drove persons and knowledge apart. The expert on the history of German foreign policy in the 18th century had little to say to the historian of the Woodrow Wilson administration; the professor who had devoted twenty years to the study of a pine tree fungus found little in common with a colleague down the hall whose speciality was urinary malfunction in cattle.

A natural concomitant of these changes was a rapid increase in the percentage of Ph.Ds. on college and university faculties. In 1884 Harvard could count only nineteen holders of the Doctorate among 189 faculty members. The University of Michigan had six Ph.Ds. on a faculty of eighty-eight. Twenty years later it was virtually impossible to obtain a professorial appointment at either of these institutions without the Ph.D. By this time the American university was a reality thanks to the work of men like Harvard's Charles W. Eliot, Andrew D. White at Cornell, Daniel Coit Gilman at Johns Hopkins University, G. Stanley Hall of Clark and Chicago's William Rainer Harper. Presidents like these buried, but did not quite kill, the old liberal arts tradition.

The products of the university system, particularly at the graduate level, were minds that knew more and more about less and less. Publishing and promotional criteria contributed significantly to this process of ever-finer honing. Books and articles were published because they offered something new that could stand the test of rigorous criticism. The narrower the subject, the greater the chance of mastery. Students who desired to integrate knowledge or work on the breadth rather than depth projects were advised to become more "professional" which meant more specialized. Libraries filled with narrow, technical studies unrelated to each other or to the problems of the day. The Renaissance man, with his wide-angle vision became the subject of derision as a dillettante.

Consider, as an example of the effect of university training, the author's own professional development. In high school I was simply a student, but soon after entering college advisers urged me to think about focusing my attention on either the humanities, social studies, or sciences. Later I was obliged to choose a major: history. By my senior year, "history" became "American history". At the Master's level, I concentrated on American Social and Intellectual History, but my Ph.D. dissertation involved a small corner of that field: American attitude toward national parks and wilderness. Further specialization found me studying Yosemite National Park, then one part of it (the Hetch Hetchy Valley where a dam was constructed), and finally the history of the Hetch Hetchy controversy between 1908 and 1913! At this point the profession deemed my research worthy of publication. I was a big fish in a very, very small pond. Six years of effort had brought me to a position where I could talk about my subject to hardly anyone except myself. Still, no one had ever walked these scholarly trails before; I was proud of adding my brick to the pile of knowledge. That was the frustrating ambivalence of the university system.

The implications of such a system for Environmental Education are unequivocal. No one with professional ambitions in a university or in advanced secondary education would dare to dabble in a subject as general as "environment". Branching out from the pyramid of increasingly-refined scholarship, instead of climbing it to the rarefied upper levels, was tantamount to academic suicide in the German inspired American university.

Even as university ideals rose to dominance in American education, rebellion against them began. Environmental education's roots lie in this new wave of educational philosophy. Actually, it was a conservative reform, aimed at restoring something of the integrated liberal arts perspective submerged by the academic specialization of the half century following the Civil War.

Because the established colleges and universities were often hard to change, some reform endeavors took place at new institutions. Reed College in Oregon opened its doors in 1912. Its curriculum deemphasized departments in favor of a broad liberal arts approach to learning. In 1921 Antioch College in Ohio launched its experimental work-study program. This practical, problem-oriented course of study anticipated several aspects of environmental education. Florida's Rollins College was reorganized in 1926 with the explicit purpose of implementing the Socratic ideal of the complete man. Its student teacher ratio of ten to one, although not quite a two-person log, was also reminiscent of the old-time liberal arts college.

The older campuses also felt the winds of academic reform. Columbia, which, under the leadership of Seth Low, became a leading American university in the late 19th century, went the other direction in 1919 with its "Great Books" program. Its purpose was to expose students to a core of man's best wisdom. Columbia's "Contemporary Civilizations" courses, a requirement of all undergraduates, had the same intent. The assumption was that no one could claim to be educated unless he had encountered the great thinkers and great ideas of the collective human endeavor. Robert M. Hutchins, the iconoclastic Chancellor of the University of Chicago, launched a similar attack on vocationalism, empiricism, and specialization in the 1930s. In their place he proposed an almost medieval curriculum of prescribed courses in logic, the classics and rhetoric.

It was Harvard, however, that struck the heaviest blow against the trend toward specialization and isolation. The same institution whose adoption of the elective system in 1869 did so much to launching the university movement turned away from its implications in 1945 with a report entitled General Education in a Free Society. Its purpose was to restore, at least partially and at the undergraduate level, the liberal arts ideal--the concept of knowledge as a body of integrated thought and values that defined the educated man. General Education, as it was instituted at Harvard in the late 1940s, required all students regardless of their major to take courses in each of the three broad categories: the humanities, natural sciences and social studies.

General Education was a deliberate retreat from the tendency of the Germanic university ideal to compartmentalize knowledge. It would, in a sense, force scientists to read poetry and require poets to become familiar with the goals and methods of science. Significantly, Harvard's adoption of General Education came directly on the heels of a striking example of the limitations of tunnel-vision knowledge: the unleashing of the power of the atom and its use in August

1945 in the devastating bombing of the Japanese cities of Hiroshima and Nagasaki. The intellectual impact of the atomic bombs was also intense. Thoughtful people realized the irony of scientific success. What many regarded as the human mind's greatest triumph in theoretical and applied physics resulted in the instantaneous murder of more human beings (80,000) than ever before in history. The conclusion could not be avoided: science, undiluted with ethical and humanitarian influences, could be man's greatest problem rather than his greatest blessing.

It would be unfair, of course, to lay the entire blame for Hiroshima and Nagasaki at the feet of academic specialization, but many felt that the university's rejection of integrated knowledge created a climate of opinion in which atomic bombs could be made and dropped by persons of frighteningly narrow expertise. General Education was an attempt to educate minds which could realize and avoid the liabilities of the scientific method while enjoying its benefits.

The roots of Environmental Education lie in the same era and mentality as the beginnings of reaction against the university ideal. As early as 1891 Wilbur Jackman's Nature Study for the Common Schools launched a nature study movement which took students outdoors to explore an indivisible environment with an integrated academic approach. Outdoor Education, as it was called by theorists such as L. B. Sharpe and Julian Smith in the 1920s, had a very similar purpose. The dissection of a frog or the study of soils in a laboratory usually had very little relation to the total context in which such things occurred. In the outdoors, however, it was impossible not to see this context and, incidentally, to see the interrelationship of frogs and soil. Nature Study and Outdoor Education forced an appreciation of the multiplicity of factors that the classroom tended to isolate. Knowledge was integrated by an integrated environment.

The "Dust Bowl" mentality of the 1930s gave rise to Conservation Education. Its primary object was to awaken Americans to environmental problems and the importance of conserving various natural resources. Because Conservation Education focused on problems which themselves were products of many interrelated factors, students exposed to such programs pursued a more integrated learning program. Clearly such an approach ran counter to prevailing academic theory as it filtered down from the universities into colleges and schools.

As it developed in the late 1960s, Environmental Education continued the same basic questioning of the reductionist and compartmentalized approach to teaching and learning. The lowest common denominator of the many varieties and levels of Environmental Education is a multidisciplinary, problem-oriented approach. Seen in the light of the present discussion, such now-cliched words carry new connotations. To be multidisciplinary, or some would say "interdisciplinary", is to go directly against the grain of the last century of the mainstream of American education. It is to avoid the reductionist pyramid and, instead, to reach out at a low level to other pyramids, other disciplines. A multidisciplinary approach also means rejection of the idea that knowledge is divided into so many pigeon holes and that extending knowledge means reaching back further and further into the holes.

A problem-orientation, the other lowest common denominator of Environmental Education, also insures an integrated approach to knowledge. Just understanding why an airshed is polluted, for instance, demands a knowledge of chemistry and meterology but also, as one probes for more basic causes, of politics, economics, intellectual history and the ethical and religious systems of a culture. The polluted air's affect on the environment makes the full range of biological and health sciences relevant. Solving an air pollution problem necessitates the involvement of law, education, planning and communication. The environment, after all, is indivisible; so must be its study. The focus on problems cuts across disciplinary lines.

Against this background it is easier to understand why Environmental Education should be understood as a multidisciplinary process rather than a discipline in itself. Rightly seen, Environmental Education does not compete with or replace biology, economics or political science. It is, rather, a way of bringing these and other appropriate disciplines to bear on environmental problems. Environmental Education acts like an umbrella over the academic community: it draws upon the disciplines as needed. Although frequently confused and resented as such, Environmental Education is not a discipline in the sense that English and physics are disciplines. It is a catalyst of disciplines. The individual practitioner of environmental education may sometimes contribute from the perspective of several disciplines. But given the breadth of environmental problems and the many subjects involved in their solution he will invariably have to fall back on specialized expertise. The important point is that the environmental student or teacher knows what questions to ask and to whom to direct them. He also knows how to interpret the answers and fit them into the jig-saw puzzle of environmental problem solving. The real speciality of Environmental Education is synthesis. Concerned as he is with a complex, indivisible environment, the environmental educator deals constantly with the interrelationships and interdependencies of the various disciplines. He functions, so to speak, as an ecologist of the academic community.

Environmental Education might also be viewed as purposeful General Education. If it is, the principal defect of the General Education idea is corrected. Welcome as General Education was in 1945 as a way of finding relief from the parallel pits of fragmented knowledge, it had obvious shortcomings. The chief of these, and the bane of thousands of undergraduates, was that there seemed "no point" to studying, say, Shakespeare if you were a Chemistry major or astronomy if you were majoring in History. And, in truth, the complaint was justified. The proponents of General Education rested content with merely getting a degree of breadth back into the curriculum. They did not defend General Education other than in the vague cliches of the well-rounded mind. Actually, in a vicious circle, they created many of the same resentments that the old liberal arts curriculum fostered when students of the 1850s wondered why they had to study Latin and theology.

Environmental Education to the rescue! Because of its multidisciplinary approach to actual problems it provides abundant and graphic reasons for wide-ranging, integrated knowledge. Moreover, the problems of concern are not contrived and "academic"; rather they are among the most vital facing contemporary civilization. No thoughtful person can honestly ask, "Why study about nuclear energy?" when, as a voter, he is being called upon to make decisions about this subject that may well prove the most consequential of his lifetime. Environmental Education, to come right to the point, provides the persuasive rationale for broad, integrated education that General Education lacked.

The General Education ideal can easily be converted to Environmental Education. It is an unimaginative teacher indeed who cannot find ways of finding most of the subjects he wishes to teach in the broad area of man-environment relations. And relating the sciences, or social studies, or humanities to real-life environmental problems is a perfect way of giving these categories of knowledge meaning, importance and excitement to minds that might otherwise ask, "What's the point?" Molecular structure, to take just one instance, may not be very attractive if it is presented to General Education students obliged by college requirement to take a course in the physical sciences. But if molecular structure were taught in connection with potentially-disastrous disturbance of the ozone layer of the upper atmosphere by freon released from aerosol cans like the student used that morning, there is compelling rationale for the study. Serious science or serious humanities, for that matter, can be snuck in the back door by the imaginative environmental educator. The result is essentially the same as that of General Education; Environmental Education just provides the spoonful of sugar.

Fantasizing about the prospects of Environmental Education as the new, purposeful General Education, I occasionally muse on the prospect of a core of six superb courses in Environmental Education. I imagine these six courses required, as part of a revamped General Education program, of every college graduate. I see them taught through extension, night and summer schools to every elementary and secondary teacher and to many adults. When I really get into the fantasy I see Congress adjourning for a year so that every member can take the sequence. The nirvanic result is that rainbow end of an environmentally literate citizenry--a society capable of structuring its relationship with the environment in a responsible manner for the long term. Here is the fulfillment of the Jeffersonian dream of an educated citizenry, but, given modern priorities, recast as an <u>environmentally</u> educated citizenry capable of making the decisions on which the future of the republic hangs today just as it did in Jefferson's time. The advantages of General Education are widely recognized; the challenge is to prove that Environmental Education <u>is</u> General Education and to have it recognized as a necessary prerequisite for effective participation in today's society.

Crystal balls are subject to shattering but possibly worth a few concluding comments. Environmental Education will, in the future, face several problems capable of destroying or at least severely altering its mission. One pitfall that must be avoided is academic isolationism. It is possible for Environmental Education in secondary or higher academic levels to build for itself the same kind of disciplinary cocoon that in theory it seeks to break down. I have argued that Environmental Education is not a discipline, but rather a multidisciplinary process that uses many disciplines. As such, it must maintain a broker position on the campus--utilizing, but not competing with, the traditional disciplines. While a core of Environmental Education faculty is certainly necessary, it would be a mistake to build an Environmental Education empire that turns its back on colleagues in other fields.

The plight of Black Studies on many campuses is a dramatic warning to Environmental Studies programs. Originally intended to integrate the study of the Afro-American experience into the curriculum, many Black Studies programs have evolved into isolated units taught by and for Black persons. Instead of

making the Black experience a campus-wide concern, such an approach fragments and isolates. Black Studies programs seek support for offering their own courses in history or music rather than using faculty resources in those departments. In some situations demands extend to the absurd end of demanding courses in Black Biology and Black Chemistry. What's Black Chemistry? Perhaps a kind of alchemy? The point is, that as Environmental Education becomes more successful, it will be increasingly difficult to resist the same kind of specialization and empire building that fragmented curriculum under the university system.

Another challenge Environmental Education must face in the future is stemming the gradual erosion of environmental studies into Environmental science. At the University of California at Santa Barbara our program is called "Environmental Studies", abbreviated ES, and it is remarkable on how many tongues and typewriters it comes out "Environmental Science". The slip may be a bit Freudian. The sciences, of course, play a major role in any program in Environmental Education, but only one role. To address any environmental problem at its root is to deal with the fundamental cause--man and his ideas, mind pollution. This takes the course of study far from the sciences. And so, perhaps three times a day, I explain as patiently as I can why we call our program "Environmental Studies" and not "Environmental Science" and why the difference is important.

To approach this problem another way, the humanities and social studies have a future responsibility to make their subject areas meaningful and relevant to Environmental Education. As yet, philosophy, religious studies, English, art, history and anthropology have not emerged very far from their tents despite the indisputable contributions they could make to Environmental Education. And these disciplines must not sulk in those tents, waiting for Environmental Education to beg them to emerge. They must take the offensive and prove their worth. I anticipate more and more humanists developing the confidence and the public responsibility that will lead them further from the ivory tower and closer to the Environmental Education endeavor.

Despite its manifold organizational difficulties, I think the future for Environmental Education lies in the team approach. The concept of a Renaissance environmental man is simply not realistic given the complexity of environmental problems. The environmental educator, like the environmental problem-solver, must sharpen his ability to utilize expertise. His challenge is to marshall the experts who know a lot about those metaphorical trees into a team that can understand the forest. No one person can possibly amass enough knowledge about enough subjects to meet the need of ordering man-environment relations for long-term harmony. Of course, this applies more to environmental research than it does to teaching. In some instructional situations it may be possible for a single mind to synthesize the appropriate knowledge. But I believe that in the future there will be decreasing chances of this occurring successfully. Teammates, with specialized knowledge, will be needed.

On the level of graduate teaching and research I see little future role for Environmental Education as we currently understand it. Teacher training is something else, but Masters and Doctorate work must continue to involve the graduate student in a speciality. A Ph.D. in environmental studies, like one in music, might be granted, but the assumption is always that some specialized skill was developed. No musician plays every instrument--at least not well. But I do

look for the specialists of the future, unlike those of the Germanic university, to preserve a catholic view that recognizes the importance of other specialities. The vital importance of broad Environmental Education training at the secondary and undergraduate levels, before the specialization takes place, is obvious.

One exception to this tendency is the possibility of graduate work in environmental impact assessment. Our society is in desperate need of what might be called "certified environmental accounts". Such persons could utilize the tools created by the state and federal laws requiring environmental impact statements far more effectively than the present crowd of poorly trained pretenders who conduct most impact assessments. Environmental Education would reach its zenith in the work of this new breed of professionals; it is a goal worth working towards on the graduate level.

In sum, Environmental Education of the future must wend its way between the scilla of fragmented knowledge as deified by the university and the charybdis of purposeless General Education that verges on dilettantism. To do this, Environmental Education must become a catalyst of disciplinary knowledge. It must find a way of compromising between the log of Mark Hopkins and the German-inspired university. There is a place for each in the future of American Education and Environmental Education as the new, purposeful General Education has the best chance of leading us toward such a future.

ENVIRONMENTAL EDUCATION: PROGRAMS, METHODS, AND MATERIALS

URBAN ENVIRONMENTAL EDUCATION: AN INDEPENDENT STUDY APPROACH

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During 1971-73, partially funded by the U. S. Office of Education, the Atlanta Public Schools developed a program at the senior high level utilizing independent study as an avenue to environmental education. This program is somewhat unique in that the student not only works outside the formal classroom, but each pursues his own chosen problem. The results of his research are presented, and preserved, in one or more of several forms -- paper, seminar, movie, slide show, or the like.

During the quarter that a student is on the program, he is released from formal class attendance for all or most of the day. Instead, he chooses an environmental problem of particular interest to him and does an in-depth study of it. Often this is a local problem, such as water pollution in a nearby creek; sometimes it is broader, such as the planning and optimum use of hiking trails in scenic areas; occasionally it is quite extensive and even philosophical, such as whether this country can survive with its present materialistic value system. At the conclusion of the quarter when the student has finished his investigation and become something of an expert on the topic, he presents his findings to some audience, such as a class in school or a civic group.

The students have the guidance and help of a teacher-adviser in their own schools with whom they work closely. In addition, they have the resources of the staff curriculum-media specialists and the coordinator who act as consultants to the individual students when they need help.

The quarter begins with an orientation period through which a student progresses at his own rate, but which normally requires about three weeks. During this time he takes a look at the scope of the environmental "crisis" and explores the areas of particular interest to him. He acquires some of the skills most commonly needed: interviewing, photography, pollution testing, audio-visual techniques, library skills, and ways of designing and conducting a research project. Finally he submits a proposal for his investigation, in which he defines his problem, explains its background and significance, describes how he plans to approach it, indicates what skills and resources he will need, and tells how he will report his findings and conclusions. At this time he contracts for the courses in which he will get academic credit. For instance, he may choose a project which will involve a great mass of data so that he will need elementary statistics and possibly the use of the computer. Thus, he may qualify for math credit. Another student, working on a non-quantitative problem, might find that its economic, political, or sociological aspects would lead to social studies credits. A number of students have earned credit for photography because they needed pictures to illustrate their investigations; some have been earned in home economics for work in a nutrition study or in geography for a project requiring extensive map-making and knowledge of topography.

Course contracts are worked out between the student and a supervising teacher or member of the environmental education staff. Written into the contract are the behavioral objectives for already existing courses in the school curriculum. No credit can be given for a course the student has already taken, nor can credit be

given for application of previously acquired skills. Students do not get course credit for environmental education per se. Rather, their contracts are designed to help them develop skills and concepts which they must master in order to tackle the chosen problem. Included in the contract are check points at which mastery of certain skills or concepts is evaluated. Dates and weights for these segmental checks are set by the student and teacher together, and the student has a voice in the selection of persons who will evaluate his contract performance.

In our experience with several hundred students we have identified certain pitfalls into which unsuspecting students and teachers may stumble. Among the difficulties for students are:

1. Defining a problem. Students tend to be vague and all-inclusive at first. Guidance and practice are needed before they can narrow their topic and focus on a manageable problem which can be handled with the resources and time available.

2. Budgeting time. Most students list this at the top of their concerns. At first the large block of time seems infinite. Eventually it is not nearly enough. Teachers can help by insisting on a time budget and by emphasizing that things generally take more, rather than less, time than anticipated.

3. Building a background. Often students try to skip this step. They want to get going immediately. One girl, who planned to compare the incidence of hepatitis in two towns, one upstream and one downstream of a large city's sewage outfall, discovered after compiling the health data, that the downstream town did not draw its water from the river in question, thus invalidating the whole study.

Individual, one-student-per-problem, independent study is a lonely undertaking. Some students tolerate this well, but a great many more seem to suffer from the lack of peer interaction and support. We recommend periodic meetings in the seminar format to share experiences, report on progress, or listen to outside speakers. Not every high school student is psychologically or intellectually suited for independent study. To screen applicants we consider teacher recommendations (from a rating sheet confidentially prepared by two teachers chosen by the student), student desire and motivation (manifest by responses to questionnaire and interview), and academic qualifications (obtained from counselors). Even those most qualified need considerable help in learning the skills, thought patterns, and work habits peculiar to independent study and research techniques. In our experience these do not come automatically and are infrequently taught in formal classroom situations.

EVALUATION STRATEGIES AND METHODOLOGIES UTILIZED IN PUBLIC SCHOOL ENVIRONMENTAL PROGRAMS AND PROJECTS—A REPORT FROM A NATIONAL STUDY*

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Abstract

The paucity of meaningful public school environmental education program and project evaluation is a growing concern among curriculum planners working within the field. Decreasing availability of fiscal support combined with the increasing demand for educational accountability mandates the development of more meaningful and effective strategies and methodologies of evaluation to facilitate program and project continuation and institutionalization in many settings.

The minimal amount of valid research data available on evaluation strategies and methodologies used in public school environmental education programs and projects is largely discontinuous and fragmentary. During the spring of 1975, a selected national sample of 536 public school environmental education program and project directors and coordinators were questioned concerning evaluation strategies and methodologies utilized in their respective programs and projects. An analysis of the study findings suggests the need for major planning and developmental efforts relative to program and project evaluation.

Introduction

Expanding population, degradation of the land, water and air, depletion of natural resources, urban blight, disappearance of previously abundant flora and fauna, and continually mounting societal tensions are all aspects of what has been generically labeled "the environmental crisis". Reactions to this crisis have been multifarious and have manifested themselves in virtually every aspect of human endeavor. In no area have these manifestations had more potential impact than in the arena of public school elementary and secondary environmental education programs.

Though its philosophical roots can be traced to man's most primitive past, environmental education is a neoteric movement, the infancy of which can be recognized as recently as the mid-1960's. Such an embryonic state was not to be long retained, however. Following the lead of an action force of dedicated and committed conservationists, educators, public officials and interested citizens, Congress passed the Environmental Education Act of 1970. Heralded as the action necessary to provide the much needed financial support and effective leadership so fundamental to comprehensive environmental education program planning, the Act added new thrust and dimension to the field of environmental education by providing for program development to a variety of institutions, agencies, and groups. Foremost among these were the elementary and secondary public education institutions of the nation.

* This study is adapted from a doctoral dissertation entitled "An Analysis of Environmental Education Program and Project Curricula In Selected Public Elementary and Secondary Schools of the United States" conducted by Ronald B. Childress through the Science and Environmental Education Program Area, Department of Curriculum and Instruction, The University of Tennessee, Knoxville, Tennessee, in the spring of 1975.

Five years have elapsed since passage of this Act. The need for environmental education has increasingly been documented by scientists, politicians, educators, and laymen alike (Meadows, 1972). Yet, problems continue to abound within the field. Serious research efforts in environmental education have been rather narrow in scope and limited in number.

At the time of this study there was no research providing a general description of the evaluation strategies and methodologies utilized in public elementary and secondary school environmental education programs and projects on a national level. The limited knowledge available was based on scattered research efforts which had concentrated on some subsystem or activity within a given state, district, or school. Consequently, this largely discontinuous and fragmentary literature mandated that practitioners utilize common sense or hunches for much of their curriculum planning and evaluation.

THE PROBLEM

Statement of the Problem

Research data describing the general characteristics of evaluation strategies and methodologies being used in public school elementary and secondary environmental education programs and projects were not available. This paucity of information was contributing to communications problems, overlap, duplication of efforts, and in many situations, inefficient utilization of human and fiscal resources. These problems were inhibiting the planning, development, operation and overall effectiveness of environmental education curricula in the nation's public schools.

Purpose of the Study

The purpose of this study was to identify, describe and analyze evaluation strategies and methodologies utilized in a selected national sample of public school elementary and secondary environmental education programs and projects.

PROCEDURES

Study Population

The study population consisted of a national sample of 536 directors and coordinators of elementary and secondary level public school environmental education programs and projects. This population was established using the following procedures:

1. A direct-mail survey was administered to all state education agency coordinators for environmental education requesting identification of programs and projects within their respective states which were applicable for inclusion in the study.

2. The ERIC Information Analysis Center for Science, Mathematics, and Environmental Education publication, A Directory of Projects and Programs In Environmental Education for Elementary and Secondary Schools (1974-75), was analyzed to identify those programs and projects which were applicable to the study.

3. A direct-mail request for assistance in identifying appropriate programs and projects for inclusion in the study population was

sent to thirty-three organizations, agencies, and individuals known to be working in the area of public school environmental education on a wide geographic basis.

Analysis of the information gathered through these sources resulted in the identification of a nationally distributed sample of 536 applicable public school elementary and secondary environmental education programs and projects. The directors and coordinators of these programs and projects comprised the study population.

Methodology

The primary methodology used in this study was a direct-mail questionnaire administered in the spring of 1975 to a selected national sample of 536 public school environmental education program and project directors and coordinators. Of the 536 questionnaires administered, 64.6 percent, or 346, could be accounted for as respondents. Of these 346 respondents, 25 indicated their respective programs or projects were not applicable to the study. A second respondent category was labeled "Miscellaneous" and included twenty responses which were representative of programs or projects no longer operational or were returned because of incorrect address, or for some unidentifiable reason, were returned not completed. Consequently, 301 or 56.2 percent of the total number of questionnaires administered were returned as usable responses.

Geographically, the usable responses were widely distributed. Only three states (Nevada, North Dakota, and South Dakota) were not represented by at least one usable response. The largest number of usable responses came from Pennsylvania (20), Illinois (16), New Jersey (15), and Florida (15). Responses from these four states represented 21.9 percent of the total number of usable responses, however, the total number of questionnaires (105) sent to these four states represented 19.6 percent of the total study population. The high percentage response and the diverse geographic distribution of the responses did not indicate a need for randomly sampling nonrespondents.

DISCUSSION OF FINDINGS

Study participants were requested to respond to a series of questions describing whether selected evaluation strategies and methodologies were used "Often", "Rarely", or "Never" in their respective programs and projects. Data describing these responses are presented in Tables I through VI.

Approaches to Program/Project Evaluation

Seven of every ten respondents reported their program or project was "Often" evaluated internally by program personnel. One hundred and thirty (43.2 percent) respondents indicated that formal evaluation following a prescribed evaluation plan was "Often" used in their program or project, while slightly over half (50.5 percent) of the directors and coordinators indicated that informal evaluation following no predetermined evaluation design was "Often" used.

Interestingly, only 27.9 percent of the respondents reported that external evaluation by non-program personnel was used "Often" in their project or program. Conversely, 32.2 percent reported this procedure was "Never" used. "Often" use of a combination of internal and external evaluation procedures was reported by 39.5 percent of the respondents, while almost half (49.2 percent) of the subjects reported "Often" usage of a combination of formal and informal evaluation techniques. A summary of this data is presented in Table I.

Goals of Program/Project Evaluation

Data describing responses to items related to the goals of program or project evaluation are presented in Table II. More than six of every ten respondents indicated "Often" use of procedures to determine if the stated program objectives had been achieved. Another 22.3 percent reported "Rare" use of such procedures. Thirty-five or 11.6 percent reported they "Never" used these evaluative procedures.

More than eight of every ten respondents used the term "Often" to describe the extent to which evaluation procedures which were directed at instructional or program improvement were utilized. A slightly smaller percentage, 69.4 percent, reported that evaluation procedures were "Often" used which were directed at curriculum revision.

Referents for Student Evaluation

Referencing data presented in Table III, 68.6 percent of the respondents reported that observed changes in student behaviors were "Often" used as an index to evaluate the effectiveness of their program or project on participants. Only 4.7 percent reported that such observed changes were "Never" used as an index to evaluate program or project effectiveness.

Concerning the extent to which students were evaluated on the basis of their performance compared to a class or group average, 25.6 percent of the respondents indicated "Often" and 29.6 percent "Rare" use of such procedures. Another 38.9 percent reported that such procedures were "Never" used in their programs or projects.

Almost 42 percent of the participants reported that students were "Often" evaluated on the basis of their performance compared to pre-specified performance objectives. Nearly 20 percent indicated that such procedures were "Never" used in their programs or projects.

Domains of Student Evaluation

Data presented in Table IV indicate that 74.1 percent of the programs and projects "Often" make provisions for evaluating students in the area of attitude development and change, while 62.8 percent of the respondents indicated likewise for the area of cognitive knowledge. Slightly over half (54.2 percent) of the respondents reported provisions were "Often" made to evaluate students in the area of skill development.

Utilization of Evaluation Strategies

Referencing data presented in Table V, evaluation strategies "Often" used in the largest percentage of programs and projects were accomplishments related to problem resolution (50.5 percent), questionnaires (47.5 percent), and open-ended self-reports (46.8 percent). Anecdotal records (24.9 percent), interviews (38.9 percent), standardized tests (18.6 percent), and attitude scales (24.6 percent) were reported as "Often" used by 38.9 percent or less of the respondents. The strategies reported as "Never" used by the largest number of respondents were standardized tests (47.2 percent), anecdotal records (35.2 percent), and attitude scales (34.6 percent).

Approaches to Student Evaluation

Data presented in Table VI describe responses to questionnaire items related to

student evaluation approaches. Teacher evaluation of students was used "Often" in 70.1 percent of the programs. Student self-evaluation and cooperative student-teacher evaluation were reported as being "Often" used in more than four of every ten programs or projects. Interestingly, student peer evaluation was used "Often" in only 15.6 percent of the programs and projects and "Rarely" used in 37.5 percent. Another 37.5 percent of the respondents indicated they "Never" used student peer evaluation designs.

CONCLUSIONS

Analysis of the data gathered as a part of this study was sufficient to support the following conclusions concerning the evaluation methodologies and strategies utilized in the environmental education programs and projects included in this study:

1. More programs and projects are evaluated internally by program and project personnel than externally by non-program personnel.

2. Most programs and projects make some use of procedures to determine if stated program objectives have been achieved.

3. Program and project evaluations are, for the most part, directed at program and instructional improvement.

4. A majority of programs and projects often use observed changes in student behaviors as an index to evaluate program effectiveness on participants.

5. More programs and projects evaluate students on the basis of their performance compared to pre-specified performance objectives than on the basis of their performance compared to a class or group average.

6. Provisions are more often made to evaluate student attitude development or change than changes in cognitive knowledge and skill development.

7. A wide variety of specific evaluation strategies are utilized in student evaluation.

8. Teacher evaluation of students is the most widely practiced method of student evaluation.

TABLE I

APPROACHES TO PROGRAM/PROJECT EVALUATION

Approach	Often Used No.	Often Used %	Rarely Used No.	Rarely Used %	Never Used No.	Never Used %	Missing Observations No.	Missing Observations %
Program or project evaluation is conducted:								
a. Formally (e.g. following a prescribed evaluation plan)	130	43.2	88	29.2	57	18.9	26	8.6
b. Informally (e.g. no pre-determined evaluation design is followed)	152	50.5	83	27.6	41	13.6	25	8.3
c. Both formally and informally	148	49.2	70	23.3	52	17.3	31	10.3
d. Internally by program personnel	213	70.8	36	12.0	23	7.6	29	9.6
e. Externally by non-program personnel	84	27.9	95	31.6	97	32.2	25	8.3
f. Both internally and externally	119	39.5	72	23.9	76	25.2	34	11.3

TABLE II

GOALS OF PROGRAM/PROJECT EVALUATION

Evaluation Goal	Often Used		Rarely Used		Never Used		Missing Observations	
	No.	%	No.	%	No.	%	No.	%
a. Procedures are used to determine if the stated program objectives have been achieved	183	60.8	67	22.3	35	11.5	16	5.3
b. Evaluation procedures are conducted which are directed at:								
1. Curriculum revision	209	69.4	55	18.3	18	6.0	19	6.3
2. Program improvement	260	86.4	20	6.6	6	2.0	15	5.0
3. Improvement of instruction	243	80.7	32	10.6	10	3.3	16	5.3

TABLE III

REFERENTS FOR STUDENT EVALUATION

Referent	Often Used		Rarely Used		Never Used		Missing Observations	
	No.	%	No.	%	No.	%	No.	%
a. Observed changes in student behaviors are used as an index to evaluate the effectiveness of this program on participants	207	68.6	67	22.3	14	4.7	13	4.3
b. Students are evaluated on the basis of their performance compared to a class or group average.	77	25.6	89	29.6	117	38.9	18	6.0
c. Students are evaluated on the basis of their performance compared to pre-specified performance objectives	126	41.9	94	31.2	60	19.9	21	6.9

TABLE I V

DOMAINS OF STUDENT EVALUATION

Domain	Often Used		Rarely Used		Never Used		Missing Observations	
	No.	%	No.	%	No.	%	No.	%
Provisions are made to evaluate students in the areas of:								
a. Skill development	163	54.2	82	27.2	37	12.3	19	6.3
b. Cognitive knowledge	189	62.8	64	21.3	29	9.6	19	6.3
c. Attitude development and change	223	74.1	47	15.6	17	5.6	14	4.7

TABLE V

UTILIZATION OF EVALUATION STRATEGIES

Evaluation Strategy	Often Used		Rarely Used		Never Used		Missing Observations	
	No.	%	No.	%	No.	%	No.	%
To what extent are the following evaluation strategies used in this program:								
a. Anecdotal records	75	24.9	89	29.6	106	35.2	31	10.3
b. Interview	117	38.9	103	34.2	57	18.9	24	8.0
c. Questionnaires	143	47.5	89	29.6	47	15.6	22	7.3
d. Standardized tests	56	18.6	77	25.6	142	47.2	26	8.6
e. Attitude scales	74	24.6	98	32.6	104	34.6	25	8.0
f. Open-ended self-report	141	46.8	77	25.6	63	20.9	20	6.6
g. Accomplishments related to problem resolution	152	50.5	66	21.9	53	17.6	30	10.0

TABLE VI

APPROACHES TO STUDENT EVALUATION

Approaches	Often Used		Rarely Used		Never Used		Missing Observations	
	No.	%	No.	%	No.	%	No.	%
Provisions are provided for:								
a. Student self-evaluation	133	44.2	100	33.2	47	15.6	21	7.0
b. Teacher evaluation of students	211	70.1	47	15.6	23	7.6	20	6.6
c. Cooperative student-teacher evaluation	136	45.2	101	33.6	44	14.6	20	6.6
d. Student peer evaluation	47	15.6	113	37.5	113	37.5	28	9.3

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SIMULATION GAMING AND PERSONAL DECISION-MAKING

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Planafam is an educational role and simulation game, which simulates the real human productive events of an entire life span. The game provides an opportunity for understanding the factors and personal decisions which influence reproductive behavior through the use of a structured role play situation.

This paper discusses the role of simulation gaming in relation to personal decision-making and population studies and reports on the preliminary results of the pilot program developed to test the effectiveness of the simulation game. Planafam has been tested on family planning workers, college students, young adults, and high school students.

INTRODUCTION

Environmental and/or population education programs embody several features which make games and role play attractive as educational techniques. These include: the strong attitudinal component of program objectives; the complexity of the systems with which these programs deal; and the resistances to change which pervade the social and economic fabric of many societies, particularly in such critical topics as fertility behavior. This paper reflects concern with some of the complexities of population studies and is based in part on personal experience in the development and testing of a role-play game for population education.

Research[1] on population studies has shown that students thrive on activities which require their active participation, including small group discussions, games and role play. This expressed potential receptivity to simulation and role play exercises indicated a fruitful area for developers of materials.

The first half of this paper discusses the role of simulation gaming in personal decision-making. The latter half of the paper reports the results of a pilot program designed to test the effectiveness of the role playing-simulation game, Planafam ∩ developed by Katherine Alden Finseth.

ROLE PLAYING AND SIMULATION GAMES

Several types of teaching techniques have evolved to bridge the gap between the conceptual level, at which much of traditional teaching occurs, and the real life situation. They can be ranked as follows:

conceptual description (i.e., lecture, discussion)	case study	open-ended case situation	role play	simulation	real life

As one moves along this continuum from the conceptual level toward real life, increasing amounts of realism enter the learning situation. Those experiences most often classed as education "games" fall into the role and simulation categories.

The role-play emphasizes interpersonal exchange[2] with students assuming assigned roles which may differ considerably from their real-life roles. The role involves a situation which is only briefly outlined, and the role-player has considerable freedom to elaborate on the role identity in interaction with other participants. Role play can be very emotionally involved, and is particularly useful for learning about processes in human interaction, and for considering the player's emotional responses to various situations.

A simulation is a more structured situation which duplicates certain real-world conditions but usually "telescopes" the time dimension. Participants play roles, but the teaching focus is shifted somewhat away from interpersonal interaction, toward the issues and processes involved in the simulation, and toward consideration of factors such as power, communication, persuasion, and planning strategy trade-offs. A simulation which achieves closure, usually through scoring or win criteria, comes closest to the popular concept of a "game."

According to Glazier[3], the elements which make games "fun" are chance, the exercise of skills, drama, and sometimes competition. "A game (also) compresses the time and space of real life situations... and gives the player a chance to learn the consequences of actions and situations without actually suffering them." Not only can a considerable amount of cognitive information be transmitted through the simulation mode, but the student primarily strengthens process skills such as planning and decision-making. These features contribute to making games and simulations attractive teaching techniques for population education where among the more difficult perceptions to transmit are the sense of vast magnitude of population problems, the relevance of large-scale concepts to individual behavior and skills, and the long time span over which population variables operate.

EFFECTIVENESS OF EDUCATIONAL GAMES

How effective have games been in an educational setting? Most studies have looked at social studies games used at the primary or secondary school level; they indicate that there is intense involvement of the students in the game role-playing experience, that there is an immediate positive attitude change toward the point of view presented through the game format, and that the magnitude of the attitude change depends on the teacher[4]. Livingston has found that the magnitude of the attitude change is not related to the specific role which a student plays[5], nor surprisingly, to understanding the game[6]. Livingston therefore suggests that games would be used at the beginning of an instructional unit to motivate learning.

Edwards[7] finds that the maximum learning of the mechanics of a game, strategies of play, and analogies between the game model and the real situation occurs during the

first several plays. However, both high and low ability students had room for further improvement and his students were eager to continue their learning through repeated plays past the first few rounds.

Coleman[8] suggests a typology for kinds of learning occurring at different stages of understanding a game and its objectives. (See Table I) One progresses from understanding of strategy through a comprehension of the situation simulated by the game, and finally to an ability to understand the more general case, the real-world situation.

Table I - Types of Game Learning

Learning Stage	Level of Understanding
1. Strategy	Actions in the particular situation
2. Perception	Understanding the particular situation
3. Analogies	Understanding the general case

Coleman suggests that post-game discussions can be used to improve learning at stages 2 and 3. His suggestion is substantiated by Kidder[9], who used a game for purposes of training future teachers. He found that the training effects were best when his game was played twice with a good discussion between plays. The groups which learned with simulation were able to perform better on a subsequent performance test than lecture groups, with or without discussion.

Guidelines on the use of simulation games in education give suggestions for increasing student understanding at the strategy and perception level, and for increasing carryover from game to the real world: emphasis is put on a "debriefing" or analysis period during which features of strategy, realism of the game model, and its implications for real life are examined.

Role plays and games in population education deserve special attention as vehicles for presenting new role models. The majority of educational games developed thus far have a competitive basis, with cooperative aspects being less important. Furthere dissection of individual games shows them to be relatively underused as channels for provision of innovative role models. The game is seldom used to examine how to modify the real situation.

In a number of studies cited by Bandura[10], the evidence show that "role enactment techniques have proved to be one of the most effective means of inducing stable, affective and attitudinal changes." Moreover, while one might regard the behavior changes in playing an "imaginary" role as superficial or non-lasting, the contrary is found to be true experimentally. The opportunity to develop or elaborate on a fictitious role enhances its capacity to bring about attitude change in the role-player. Hovland *et al.* say[11]:

> "One of the salient characteristics of improvisation is that the individual reformulates the communication in his own words. It is possible that reformulation per se may give rise to a marked gain in comprehension of the content and thereby augment the chances that the persuasive communication will be influential. Opinion change may be facilitated by the mere act of translating the content into a more familiar vocabulary."

The use of simulation, role-play, and modelling techniques in population studies appears desirable, provided that adequate consideration is given to the types of behaviors and attitudes being presented. Some types for population studies would be willingness and ability to consider long-range consequences of one's decisions, and an appreciation for man as a part of the natural order, rather than a being apart.

Games and role-plays can, and should be used in population studies to facilitate the examination of values and to provide role-models for the adaptation of new behaviors. Their other advantage for presentation of complex concepts and compression of large-scale effects make them additionally attractive to the population educator[12].

We shall now discuss the Planafam development and field testing of an educational game for teaching population concepts.

EARLY VERSIONS OF PLANAFAM

The earliest version of Planafam I was a board game which utilized role play techniques. A primary purpose of the game was to increase the student's personal awareness of social norms and biological constraints in fertility behavior. Players traced the entire reproductive lifespan of a couple from rural India, making decisions which influenced their family size and composition. The teacher functioned as a roving provoker of discussion, asking questions, and focusing students within the framework of Indian culture. This Indian game, Planafam I, introduced the player to role-playing or reproductive decisions in an unfamiliar and non-threatening context. Planafam I was developed by Dr. Harold Thomas, Jr., of Harvard University.

Planafam II, developed jointly by Dr. Thomas and Dr. Katherine Finseth, was a role-play exercise to Planafam I. The difference was that Planafam II was based on a framework of American culture. Planafam II was restricted in applicability to the United States and countries with similar demographic statistics. Its open-ended format made it potentially adaptable to other countries, however, with suitable modification of the demographic elements alone. The role player in Planafam II, (part of a group from 3-10 players) took the role of a woman whose reproductive life provided the focus for the game. The game introduced population-related concepts and understanding into the classroom in a role playing format[13].

Both Planafam I and II are basically solitaire in format, although either can be played by a small group of players cooperating in the decision process. Both Planafam I and II have been used to a limited extent in population studies settings in the United States and abroad.

In the pilot testing of Planafam I and II, a number of serious drawbacks to effective implementation were identified. A primary drawback was the need for a well-trained leader or teacher to make the game effective. The length of time to play the game was another factor. Based on this and other evaluation information, Dr. Finseth has redesigned the game. The new version, Planafam is a streamlined board game. It can be played by one person, by a couple, or by larger numbers of people. The play of the game can be completed in less than 45 minutes, independent of a trainer or a teacher. Optional modes of play include: individual, couple, group or class, independently or competitively; or on any of three socio-economic development levels. Planafam III and the preliminary results of the pilot testing program are described in the next section of this paper.

PLANAFAM

Planafam is an educational role game, which simulates the real human reproductive events of an entire lifespan. The game provides an opportunity for understanding the factors and personal decisions which influence reproductive behavior through the use of a structured role play situation.

In Planafam, players "live" through the reproductive period of a woman's life. The game is designed to promote an understanding of the personal and family considerations which contribute to reproductive decisions: to create an awareness of the relationship of such individual changes in population variables at societal levels; and to illustrate the time span over which one's thinking must extend when considering the results of fertility behavior on population dynamics.

The occurrence of certain events in Planafam is determined by actual probabilities. These include such features as infant and child mortality, maternal mortality, and age of menopause. Biological factors such as the probability of pregnancy and miscarriage are fixed at known realistic levels. The game can be played at any of three socio-economic development levels: highly developed; moderately developed; and low level development.

Personal decisions, however, are introduced by the Planafam player emphasizing the importance of such individual factors on reproductive events. Players can decide on such matters as desired family size, sex composition, marital status, and means of achieving fertility control. Each player can apply his or her own values, and those of their society in playing Planafam.

While Planafam can be played by persons with grade school education, its impact is greatest on teenagers and young adults who are early in their reproductive lives.

The game can be played competitively or it can be played cooperatively, with one or more players sharing in the decision-making, in order to discover the effects of the group processes on the actual family outcome. An instructor or trainer is not necessary. The rules of the game are contained in a clearly worded game manual.

Significant improvements in the development of Planafam from earlier versions are:

1. A means of playing the game competitively, if that mode is deemed suitable for meeting the instructor's or player's objectives.

2. The option to play the game using biological probabilities reflective of any of three discrete levels of socio-economic and health development.

3. The inclusion of new, and significant, stochastic biological variables, including miscarriage (spontaneous abortion), variable age of menopause, twinning, maternal mortality, complications associated with use of certain contraceptives and birth of defective or sickly offspring.

4. The possibility of elective sterilization, in addition to other means of fertility control.

5. Nursing or bottle-feeding options for care of newborn.

6. A flexible scoring system, adaptable to the instructor's objectives.

7. A clearly-worded game manual, which includes the game rules, suggestions for classroom and training use of Planafam to meet different teaching objectives, and a self-instructional section on the techniques for using the game to maximize understanding of social constraints on reproductive decision-making.

RESULTS AND DISCUSSION

After the redesign of Planafam as described previously, a mock-up was prepared for the pilot testing program. The pilot program was conducted on two groups. The first group consisted of student and adults with no professional interest in population studies. The second major group were participants at a Development Administrators Training Program at the University of Connecticut, and were administrators in family planning and health programs from a number of developing countries in Africa and Asia. They were responsible for the development and administration of training programs in their home countries.

The first group comprised a junior high school class in an urban setting, three high school classes (1 home economics class, 1 biology class, and 1 environmental studies class), a college environmental studies class, and a random sample of young adults 22-35 years old. Each group played Planafam in the developed country version for the first time in approximately forty minutes. After completing the game they were asked three questions:

1. What was the most important thing you learned from playing Planafam?
2. Would you want to play Planafam again? Why?
3. Can you think of any changes which would make the Planafam game more interesting or more informative for students?

Answers to the first question have been tabulated for comparison with six fundamental objectives the game is designed to illustrate. The players' unstructured responses were sorted into these six categories plus a seventh miscellaneous category. If more than one response was given, only the first was counted. The results are presented in Table II.

There was no attempt to teach these or any other objectives. It is essential to remember that the only instruction accompanying the Planafam game was in the play of the game itself. There was no class time spent on population studies prior to testing, nor was there any discussion following the game. The questionnaire was distributed and completed before the end of the class.

While the questionnaire after the pilot testing program was not designed as a scientific test of the simulation game, several trends are indicated that deserve further investigation. A common phenomenon observable in playing Planafam is that timing, sex and number of children that a family has are not always identical to original plans. This was the objective most commonly learned by these players as a combined group. It is interesting that the most important thing learned from Planafam for the majority of players in junior and senior high school is "outcomes not always as planned." For college students and young adults, on the other hand, the most commonly observed learning is "an opportunity to integrate reproductive decisions with other life plans." This shift, with age, probably reflects the increased importance of family and career decisions to young adults after high school. The length of the reproductive period was an important lesson for younger students.

For optimal education use of Planafam, however, it should be considered part of a package with an introduction, game play and guided discussion afterwards. Scope and content of the introductory and post-game activities can be varied to meet individual class and age needs.

Although this was not examined in the formal testing program, we have found that the educational value of Planafam is greatly enhanced by discussion, and the use of other

TABLE II

SAMPLE GROUP	Junior High	Senior High	College	Young Adults	Total
Number of players in sample	26	64	28	15	133
What was the most important thing you learned from playing Planafam?					
a) outcome not always as planned.	13 (50%)	18 (28.2%)	4 (14.3%)	4 (26.7%)	39 (29.3%)
b) awareness of risks in reproduction	1 (3.8%)	7 (10.9%)	3 (19.7%)	1 (6.7%)	12 (9.0%)
c) reproductive lifespan is long	4 (15.4%)	12 (18.9%)	1 (3.6%)	2 (13.3%)	19 (14.3%)
d) opportunity to integrate reproductive decisions with other life plans.	0 (0%)	8 (11.9%)	1 (42.9%)	8 (53.3%)	28 (21.1%)
e) through modern contraception gain some control of outcome	3 (11.5%)	10 (15.8%)	4 (14.3%)	0	17 (12.8%)
f) concept of child spacing & reproductive timing	0	3 (4.9%)	1 (3.6%)	0	4 (3.0%)
g) miscellaneous comments that could not be classified above	5 (19.3%)	6 (9.4%)	3 (10.6%)	0	14 (10.5%)
Would you want to play Planafam again?	25 (96.2%)	60 (93.8%)	28 (100%)	15 (100%)	128 (96.2%)
Why? (see text)					

education techniques subsequent to play. The game arouses keen interest. This can best be exploited by a teacher who has a set of classroom objectives clearly in mind. Teachers who can synchronize the game Planafam with an exploration of its significance in the real world, also have had considerable success. In general, the educational outcome is improved with introductory and post-game activities.

In response to question 2, participants indicated a wide range of reasons for wanting to play Planafam again. However, the principal reasons were the desire for an opportunity to compare and examine outcomes using another set of assumptions during play or to see if their original assumptions would lead to the same outcome in a repeat trial. In a number of the pilot testing situations, copies of the game were available for additional play outside of class on a student's time. Unofficial results indicate that half of the girls and one-third of the boys returned for an additional opportunity to play Planafam.

The second major group on whom Planafam was pilot tested with 13 participants was at a training program for development administrators. The participants were family planning and health administrators from developing countries in Africa and Asia. The entire group had experience in developing their own training and educational programs. The game format was varied from individual play described above. Planafam was played in small groups. One person served as the family planning official while the rest of the group were villagers. The role of the family planning officials was to alter the villagers family planning practices. This game format was used to illustrate the problems a health official has when attempting to introduce new family planning practices into a village with its own cultural pattern.

After the session, each participant was given a list of session goals. They were asked to rate how well each goal was met in the Planafam session, using a Likert-type scale ranging from 1 or poor to 5 or excellent. The results are reported in Table III.

While the sample is small, there is an indication that the Planafam session provided participants an opportunity to relate their actions as individuals and professionals to their own feelings and their own culture and society. Also, the game session provided administrators an experience in gaming as a training and educational technique. Additional data have been obtained on the results of Planafam with this and another comparable group of administrations, showing that players learned about traditional methods of contraception which might already be in use in their target areas, and about cultural practices which influence fertility indirectly. Further studies are in progress, using Planafam in the training of administrators; they will be reported elsewhere.

CONCLUSION

Relating all of this to the topic of population studies in general, the use of teaching methods which are personally involving for the students, which deal with higher-order behaviors, and which result in attitude change, have a very definite place in the population studies repertoire.

Role play, simulation, and the other techniques described here are among the best currently available for developing an understanding of complex systems, and for inducing attitude change, if only transient, among students. They should be integrated into population study strategies with particular awareness of their optimal use, and of one's instructional objectives.

TABLE III

RATING OF GOALS

SESSION WITH FAMILY PLANNING AND HEALTH ADMINISTRATORS

n=13

GOAL	Average Rating
1. Recognize population dynamics at the family level as a complex system with social and individual components.	3.46
2. Be able to analyze parts of the above system.	3.15
3. Relate your general knowledge of family planning and population planning to your own feelings and your own culture and society.	3.76
4. Begin to think of your own actions ad individuals and professionals as they relate to your cultures' population dynamic systems.	4.23
5. Experience gaming as an educational technique and consider the relationship of gaming to your own behavioral and attitudinal objectives.	4.31
6. Feel that the time spent in the Planafam session has been worthwhile for cognitive and attitudinal reasons.	4.15

Rating scale: 1 poor

2 fair

3 average

4 good

5 excellent

Preliminary results of pilot testing of Planafam, with participants from the United States and from developing countries, indicate a role for simulation experiences within a structured program for population studies or family planning programs. The initial trials with Planafam have allowed a first-level de-bugging. A more extensive evaluation is planned, followed by production and distribution.

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ENVIRONMENTAL EDUCATION FOR COMMUNITY ACTION

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Atlanta, Georgia

Tim Weller pointed to a shaded intersection on the large wall map of the county.

> "That's the second legal sanitary landfill franchised by the county. There's another operation down here, but it doesn't meet standards and shouldn't be open. We have a law suit pending against them. We've been trying to close it down for two years. That court case is finally coming up in two weeks."

He turned away from the map, stepped back toward his desk, and sat down on the edge of it. Weller rubbed his hand across his forehead.

> "Yea, you've put your finger on a pretty serious problem we have in this county, and there's no easy solution."

Weller shook his head.

> "People just pack up their plastic bags full of garbage and trash and drive out after dark to dump it along some country road. We find garbage dumped all along rural roads and even on private property!"

Weller, one of the hard-working professional planners in Gwinnett County's Department of Planning and Zoning, was explaining the big knots in the solid waste collection and disposal program of the county. This county is located in the urban fringe of the Atlanta metro area. In the last ten years it has nearly doubled its population, and it has changed radically from an area of small towns and farms to an area of heavy traffic, sprawling sub-divisions, numerous light industries, and shopping centers.

> "You know, some folks just haul their own garbage and trash to the landfills and pay by-the-load to dump it. Many others pay for the commercial pickup service but aren't terribly satisfied with it."

> "Let me tell you -- I live in a subdivision out in the county where we subscribe to the collection service. And, you know, it gets mighty frustrating after I have trimmed my trees and cut the lawn to have this big pile of clippings sit by the curb for weeks and weeks before they finally come to pick it up."

> "Sometimes I feel like carrying that stuff out and dumpting it on a rural road somewhere!"

What you have been hearing is one of the voices of the county community where Environmental Education for the Secondary Schools, a curriculum development project, has been collecting first-hand information on local environmental problems. The name of the official is changed, but the situation and his personal perspective on that situation are very real.

Garbage disposal is a serious problem in Gwinnett County and many other metro counties as well. Tons of garbage and trash thrown along roadsides and on private

property are creating a health hazard, an expensive clean-up job for the county and blighted scenery for residents and passersby.

The project, Environmental Education for the Secondary Schools, is based at the University of Georgia and is partially supported by a grant from the Office of Education. A major objective of Environmental Education for the Secondary Schools is to prepare instructional materials and build learning activities on the actual environmental problems which plague the locality where the students live.

Many of the problems of rapid population growth -- including pollution, crowding, land use problems, resource distribution problems and transportation problems -- tend to be universal to metro areas. However, a presentation of abstract generalizations and principles does not prepare high school students for environmental action. Therefore, we are attempting to teach about the environment in concrete, personal, applied terms.

Our assumption is that an understanding of environmental principles is more effectively developed from a sense of personal involvement. An investigation of local problems which affect the student and his family is utilized to teach knowledge, conceptualization and analytical processes important to making decisions about environmental issues.

First-hand Observation

To highlight the direct effects of environmental conditions on the lives of individuals and to dramatize man's interdependence with the rest of nature, much had to be learned about the prevailing local problems of the environment. Local people and familiar places had to be revealed as actors and reactors in a system of biotic and abiotic components.

Therefore, the members of the project staff became first-hand observers of the county-community. For four months last fall and winter, we were involved in the collection of factual information and various viewpoints on issues related to the county environment. Our resources were numerous and varied -- extensive personal interviews of community leaders, county officials, students and teachers; daily reading of the county newspaper; and observation of government facilities, business operations, and general physical and social conditions. These community resources added a wealth of specific information, examples and exceptions to our academic preparations at the University.

Once immersed in the social-political-economic concerns of this fast-growing county, we found that most of the public issues headlined and bylined in the press or discussed by a banker, a regional official, a teacher or a county commissioner, were related directly or indirectly to the environment. Extensive development and rapid unplanned growth was taking its toll.

Parallel Course Instruction

When we had identified the main environmental problems of the county-community, we mapped out plans for developing coordinated modular instructional materials for both social studies and science classes at the ninth and tenth grade levels.

One objective of the EESS project is to promote a sound knowledge base for environmental learning. This is an attempt to get away from one-shot interdisciplinary courses which tend to lack depth and continuity. Our program attempts to inject environmental studies into existing social studies and science classes.

The rationale behind the proposed development of joint science and social studies

materials are based on several considerations:

1. Environmental issues do not fall into the domains of separate disciplines or departments. By nature they are interdisciplinary. They have scientific and social causes and scientific and social implications. However, the interdisciplinary treatment in the schools must be sound. Basic knowledge, skills, and sensitivities are necessary groundworks.

2. In secondary schools the subject areas most closely tied to environmental decision-making are science and social studies. Shortcomings in environmental education in junior and senior high schools are rooted in the common failure to plan and carry out scientific and social education with common objectives and content focuses.

3. A broad synthesis of concepts and skills from the social sciences, history and the natural sciences is necessary for both the rationality and the sensitivity needed to solve environmental problems. There are also common descriptive and analytical thought processes which are among the goals of social studies and science and these can be unified in a common problems focus. The garbage disposal problem, for example, requires scientific knowledge and a consideration of the social and economic alternatives.

4. Secondary schools throughout the United States are usually departmentalized. Working through the existing science and social studies departments we can organize cooperative planning within the existing structure and thus minimize resistance to change.

Materials Development

Parallel materials were developed in modular form for application to approximately three weeks of instruction in social studies and science classes of both grade levels. The purpose of the modular form is to provide self-contained units of study which have a flexibility of use within a range of courses and county schools.

The development of the modules was planned closely with the teachers of Berkmar High School where we have been working. This is the county's largest high school with about 2000 students. To meet specific needs described by the teachers, we agreed to prepare the tenth grade materials for students who are generally low performers and the ninth grade materials for above-average to average students.

The materials we developed are interdisciplinary in that they draw information and analytical processes from several disciplines in order to probe an environmental issue biologically, chemically, politically, historically, etc.

The project team, by the way, is also interdisciplinary. I am a social studies educator serving as director of the project and social studies coordinator. The team includes a science education professor who is the science coordinator, another science education professor serving as evaluator and two research assistants, one in science education and the other in social studies education. The special interests of our team span a variety of disciplines from political science to geology to history and biology and chemistry.

Working with the project team in an advisory capacity in the development stage and then in an active capacity in the implementation stage, is a team of social

studies and science teachers. We were fortunate to be working in a school where the teachers were not put off by the notion of planning across departments. There were some initial worries about whether the history book and the zoological nomenclature could be covered during the quarter when the modules are taught. However, once I explained our purposes and our general plan, the teachers were not only cooperative, but provided valuable suggestions for developing community-focused activities.

We have now completed the pilot test of the ninth grade material and are in the midst of testing the tenth grade material. And already we are convinced that cross-departmental coordination of environmental instruction can be successfully carried out.

The modular materials which we have developed include readings, guided classroom activities, field activities, values exercises, and simulations. In addition, there are slide sets, a slide-tape review, wall maps, and sets of black and white photos. Some of these still have rough edges and are slated to be revised based on evaluations by students and teachers following the field tests.

An instructional sequence guided the development of the modules:

MODULES SEQUENCE EESS

1. OPENING
   CONFRONTATION WITH ENVIRONMENTAL PROBLEMS BY MEANS OF

   -- DRAMATIC EPISODE (FACTUAL OR FICTIONAL BASED ON FACT)
   -- PERPLEXING SITUATION-NEWS REPORTING STYLE
   -- VISUAL SERIES OR A VISUALS/QUOTATIONS MONTAGE

2. INFORMATIONAL STAGE
   BUILD FOUNDATIONS FOR DECISION-MAKING BY PROVIDING

   -- DATA AND PERSPECTIVES FOR BUILDING TO SUMMARY STATEMENTS OR GENERALIZATIONS
   -- SUMMARY STATEMENTS FOR ANALYSIS AND APPLICATION TO OTHER SETS OF DATA
   -- VALUES "SITUATIONS"

3. UTILIZATION-OPPORTUNITY TO APPLY PREVIOUS LEARNING TO A PARTICULAR PROBLEM STUDIED IN MORE DEPTH

   -- CASE STUDY OR DETAILED REPORT
   -- COMPARATIVE STUDY
   -- MULTIPLE PERSPECTIVES

4. ACTION-EXPLORATION OF CHANNELS FOR INDIVIDUAL AND GROUP ACTION

   -- INDIVIDUAL ACTION
   -- OBTAINING INFORMATION, FAMILIARITY WITH AGENCIES OF RESEARCH, INFORMATION AND SERVICE
   -- INTEREST GROUPS OR PRESSURE GROUPS
   -- PUBLICITY-KEEPING OTHERS INFORMED
   -- CIVIC ACTION-USING FORMAL POLITICAL CHANNELS TO PROVIDE A PUBLIC FORUM ON THE ISSUE TO BRING ABOUT CHANGE AND IMPROVEMENT

Every Decision Involves Trade-Offs

Another main purpose of EESS is to promote an insight into the process of intelligent trade-offs and a skill in determining and weighing the trade-offs in the process of making an environmental decision. In assessing the trade-offs, students must weight the ecological, economic, social, and other types of advantages and disadvantages which are the consequences of projected alternatives for action.

A full awareness of the trade-offs involved in making choices that relate to the environment requires that students have a broad perspective of the interlinkage of social and physical factors. Students have to have practice to learn to sort out the complex of gains, no effects and losses in any decision.

For example, we developed a land use simulation in the ninth grade materials, titled "Zone of Contention", which places each student in a role related to a rezoning request to develop a sanitary landfill on a piece of land located about one-half mile from the school and currently zoned for multiple family dwellings. From the varying perspectives of their roles, they had to consider the physical, social, political, and economic effects of a pro OR con decision. Students came up with realistic and interesting comments on whether they, in their roles, would win reelection, lose quiet residential surroundings, gain a job, obtain convenience in garbage disposal, or lose some degree of street safety with heavy truck traffic as a consequence of the landfill development. In the discussion session following the simulation they considered all of the potential effects and considered what they were willing to give up to gain something else.

The simulation activity apparently also revealed some limits of individual action to many students who played the roles of citizens at the hearing. They could voice their views and hope to influence the Zoning Appeals Board, but once the hearing was over, they could not contribute to the final decision which is left to members of that appointed board.

Channels of Action

To promote a general awareness of the "give and take" of public policy decisions and to provide experiences in assessing the trade-offs, the social studies modules provide alternatives for action on several major problems -- continued community growth and development, waste disposal, water supply, land use, and sewerage systems. Students are asked to weight various costs and advantages of inaction and proposed action or "solutions" to each one of the problem areas.

Hence, students are alerted to various channels for public action such as public meetings, voting on bond issues, communicating with their district county commissioner or communicating with the rest of the public by writing a letter to the newspaper editor.

The simulation was a culminating activity for the ninth grade social studies and science modules. Up to the point of the simulation activity, the learning activities in science and social studies classes were related but moved along through their own separate sequence. Then in the last part of the modules, the simulation is introduced in one class and continues through three days of both classes (or six class sessions) including introduction, group meetings, the hearings, the decisive meeting of the Zoning Board of Appeals, and the post-game discussion.

This cross-course, cross-departmental final instructional activity was developed into the materials to provide an opportunity for students to actually look over

real alternatives in a tangible case and decide how to act. It is a means of testing the application of studies in both modules.

Field Experiences

Public officials, businessmen, teachers, and pressmen gave us leads on possible productive field trips. As we developed the materials, we checked out a number of these suggestions and selected field experiences which would be integral to the unit.

In each case so far, the field experience has been a high motivator for more abstract learning and has provided a dimension and intensity of concrete learning that we could not have predicted. For example, I worked closely with the ninth grade science and social studies teachers and planned and arranged a full day of field investigation of local land use alternatives.

We started out in the early morning driving to the north of the county to look over a proposed commercial development area of approximately 35 acres. It had been bulldozed clear of all vegetation approximately 18 months before and because of adverse economic conditions, it remained undeveloped -- denuded and eroded by rain and wind. We walked to a nearby stream and observed the obvious and extreme effects of siltation there. Students actively questioned and hypothesized. What will happen when all this is paved over? How will it affect the creek? Can they just leave it this way? There should be, maybe there is, a law.

Some were amazed that this was an example of what they had been studying. Several said they had passed the location numerous times and never thought twice about it -- except one outspoken fellow who said he had recently commented to a buddy that he heard that a MacDonald's was to be built there, and he wished they would hurry! Enroute from this stop, students spotted additional evidence of severe erosion and we stopped the bus to briefly look over the situation.

Our bus driver then took us north to an area close to the Fulton County line to a wooded location where a huge modern building of approximately 58,000 square feet is actually nestled in the trees on a high bank overlooking the Chattahoochee River. This is the international headquarters of the Simmons (mattress and furniture) Corporation.

It is a fine example of "design with nature". It was built on angled concrete and steel pilings so as to disturb natural water drainage and plant life as little as possible. There was an unbelievable minimum of bulldozing or paving. The cars of about 500 employees were parked here and there is small cleared areas under the trees. The building of gradually weathering cedar and cyprus blends into the natural surroundings like a huge naturally camouflaged bird.

The students began to speak in whispers. They were obviously in awe of this accomplishment. They had read a whole chapter about land use planning and working with nature, but here was impressive evidence that it could be done! Imagine, a big corporation's office complex, located at the end of a narrow winding wooded road on a green hilltop overlooking a large river!

After four hours of inspecting the Simmons complex, analyzing its cost and service advantages and disadvantages, we then moved on to closely observe another use of land. We visited one of the legally operated county franchised sanitary landfills.

The Arnold Landfill provided some vivid data for both sight and smell! We observed the trenching method of sanitary filling in operation, and we were all

wide-eyed at the number of mammoth trucks and the heavy large loads of trash and garbage they brought in. We walked the surface of the already filled land; talked with the operator about his concerns over local and state regulations. (He complained about being forbidden to salvage useful items.) We inspected the price chart and learned that a gigantic oak tree stump had cost the dumper $25 to get rid of it.

Perhaps you can gather from this description the rich input that field experience can add to classroom studies. The only cost was gasoline for the bus and about one day's planning time in the project.

Evaluation

How will we know something about the effects of this project? At the completion of each module, teachers evaluate various facets of the material and the instructional sequence. Students are pre- and post-tested for cognitive and affective change. In the cognitive tests, we are especially interested in any changes resulting in higher level thought processes -- analysis, evaluation, and synthesis.

Outside observers have sampled classroom and field activities, recording interaction patterns and visible affective responses from students.

We have collected a pile of data on the completed ninth grade modules which remains to be analyzed this spring and summer.

The tenth grade modules are currently in use at Berkmar High School and will be evaluated in about ten days.

Summary

Our daily lives involve the making of numerous decisions ranging from informal and personal choices such as deciding not to purchase throw-away bottles of cola and consciously choosing the returnable type, to more formal public decisions such as attending and speaking at a public rezoning hearing and joining an environmental interest group or lobby.

The quality of public environmental policy and personal environmental attitudes is dependent on environmental knowledge, skills, and sensitivities drawn from scientific, social, and humanistic study. These capabilities can influence the decision-making of individuals and groups and make a difference in our society.

Based on the belief that environmental education must attempt to develop these capabilities, Environmental Education for the Secondary Schools is attempting to provide materials and an instructional model to carry this out in junior and senior high schools.

Let me close my remarks by turning back to the county-community for the words of another interviewee, the young mayor of the fastest growing city in the county:

The mayor of one city in the county took time from his busy day as a private businessman and public official to talk over local environmental problems with us. His city now has about 15 times the population it had in 1960. He described some of the growth problems:

"When I took over as mayor two years ago, the first summer we had a water crisis that was unreal. People living up on all of the high elevations around here were out of water for weeks at a time. There just weren't enough arteries to provide water pressure to push the water up to all the folks in those new hilltop subdivisions."

"I had people on my phone, at my office, and on my front porch complaining about the situation."

He leaned forward in his chair and pointed out the window of his office.

"One family up there in the Nob Hill development could see our big water tower just across from the kitchen window, but they couldn't get a drop of water. They were mad, and they should have been."

"Flooding is another problem here. Some builders came in and put up homes where they shouldn't. That was before we had plans, zoning, and regulations."

"This one house sat vacant for nine months, and then a woman bought it. It's a beautiful home, but it's in a flood plain, and everytime it rains hard the septic tank backs up into her basement. Last March Mrs. Bellini called me to come out there to see what had happened to her yard. You wouldn't believe it. There was a big bubble, like a huge balloon, but so hard you could walk on it. Gas, sewage, and water had formed under the yard and were coming up in a big stinking bubble!"

"We have tried to help. We put in additional drainage ditches in that area. The contractor ran drain tiles through Mrs. Bellini's yard and and filled in the low area. But you know, we've grown so fast it is unreal. We have to take on the problems that were caused years ago. We've got a lot to learn and a lot to do to avoid these things in the future."

ENVIRONMENTAL EDUCATION
A STRUCTURE FOR ELEMENTARY TEACHER EDUCATION

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In response to the concerns of society and the conditions of man's environments, many schools are incorporating an environmental emphasis in the curriculum at all levels, kindergarten through grade twelve. It is apparent that beginning teachers should have preparation for working with boys and girls in the development of knowledge, attitudes, and skills for living successfully in the indoor and outdoor habitats of our world.

Institutions of higher education are responding with a combination of resources and techniques that will, hopefully, assist teachers to be competent and confident in planning meaningful environmental learning experiences for and with boys and girls in the elementary schools. Teacher preparation programs include a variety of environments and materials, and usually stress an investigative or inquiry approach to learning. Faculties of teacher education institutions have approached this new challenge with varying degrees of commitment and enthusiasm; some have incorporated a minimal amount of environmental education work, while others have restructured their programs to include and/or highlight many aspects of learning-and-teaching about environments.

A three-year study, completed in September, 1973, focused on identification of teacher competencies for elementary school teachers who work with children in programs of resident outdoor education.[1] Directors of resident outdoor education programs, and classroom teachers, were asked to respond to 165 competencies "needed by classroom teachers." The directors identified only nine competencies as being competencies held by elementary school teachers; the teachers did not do much better - they identified twenty-four - agreeing that there were 141 competencies missing in the qualifications of the elementary school teacher.

With this as a "given" - that teachers should have environmental education in their undergraduate program - and following the current trend of including environmental education as an emphasis in many curricular areas - some plan for preparing teachers to be competent and confident in working with children in the study of environmental education must be developed. A course in "Environmental Education" - sandwiched in among other required coursework is not the answer. A complete package is needed, one that cuts across subject lines (who can place EE with science or social studies?) and that is steadfast enough to allow the teacher to become comfortable with environmental education concepts, skills, and attitudes and related teaching techniques.

A proposed model for undergraduate teacher education programs has environmental education as the structural theme. This alternative approach has been titled "Laboratory Approach to Teacher Education," and is available to elementary education

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[1] Lillabelle Holt, "Identification of the Competencies Needed by the Classroom Teacher in Programs of Resident Outdoor Education," (doctoral dissertation, Ohio University, Athens, Ohio, 1973).

majors preparing for teaching careers in kindergarten through grade eight. The teacher preparation sequence utilizes a variety of learning environments in both indoor and outdoor settings, on and off campus, during a four-year sequence of courses and related experiences.

In this program, preparation for teaching has been expanded from the traditional junior-senior years sequence to four years of undergraduate work; environmental education experiences are incorporated into the program from a freshman early experience program in the first year of college and continues to the culminating student teaching quarter. Most experiences are required for all elementary education majors in this program; a few are available as options (ex. - summer employment).

Environmental education reinforces and "pulls together" the Laboratory Approach to Teacher Education program in the following ways:

"Methods" Courses

Blocking of courses (ex. - science and social studies) and field-based settings for learning allow faculty to a) set aside time for development of environmental education in the various subject areas, and b) direct students in participation experiences in a variety of classroom and school settings where environmental education is a recognized emphasis in the school curriculum.

Faculty have made a commitment to environmental education as a structural theme in the elementary education program. Faculty and student experiences in related professional meetings and workshops are facilitated and reinforced by attendance and participation, as well as leadership, in state and national organizations and conferences.

A further commitment - teaching an environmental education in all curricular areas - is coordinated by teacher education faculty. Experiences in reading, language arts, social studies, mathematics, and science are provided by faculty in the university classrooms and by students as they participate in the area elementary school classrooms.

Nature Trail

Environmental study areas on the campus, (including parking areas, landscaped plots, drainage ditches, etc., and a designated nature trail), allow students to have learning experiences in various outdoor habitats, and to plan instructional involvements for elementary school boys and girls.

Guides for learning on and about the nature trail have been developed for children. University students in elementary education serve as guides and resource persons when teachers with elementary school classes visit the facility to explore and experiment in the out-of-doors.

Environmental Education Workshop

An environmental education workshop is available to undergraduate elementary education students during the summer quarter. This workshop allows students to acquire an in-depth knowledge of the field of environmental education and to develop an extensive resource file of related teaching materials for classroom use.

Techniques for incorporating an environmental education emphasis in the various subject areas in the elementary school are extended and reinforced in the workshop format as the class studies and explores the busy intersection of an inner city district, the heating and cooling system of the university, an abandoned farm site, or a nearby cemetery. In addition, each student selects a topic of environmental interest; after researching a specific question(s), the results of the investigation are reported to the total group in both oral and written form.

Student Involvements

There is a concerted effort to encourage students to become involved in related and worthwhile activities. Faculty and students attend regional workshops sponsored by resident staff and organizations (including state agencies). Study grips are taken to nature centers, environmental education sites, and outdoor laboratories. In addition, students provide in-service workshops for teachers and educational aides - sharing their acquired knowledge of teaching techniques and teacher-made learning materials for environmental education.

In the spring, opportunities are identified for student employment as leaders, counselors, and teachers in summer programs which emphasize or incorporate environmental education experiences.

Other Campus Faculty

Attempts of the education faculty to develop a cohesive teacher education program with an emphasis on environmental education is supplemented by other faculty of the university. Environmental education interests have been identified as science and humanities faculty cooperate in field trips and study sessions - bird-banding and related investigations, installation of weather-recording instruments on campus roofs, treks to ocean habitats, etc. Interdepartment and intercollege efforts have evolved from geography and education professors providing learning experiences at strip mine sites in southeastern Ohio, and from science and education professors serving as faculty members on the nature trail development committee.

A spirit of "working together on environmental education" has helped identify individual faculty involvement and expertise in this area, and has encouraged others to become involved in workshops and individual studies related to this field.

Resident Environmental Education

The environmental emphasis culminates in an in-depth experience during the student teaching spring quarter when instructional roles are filled by university students in area resident programs.

The camp experience is supplemented by pre-camp classroom preparation for learning in the outdoor setting and by post-camp follow-up activities when the pupils, teacher, and student teacher return to the indoor classroom.

During the resident program, the student teacher accepts the teacher's responsibilities for guiding learning at the camp, and for all other teacher assignments

such as staff planning weekends, parent orientation evening sessions, dormitory supervision, physical education activities, and evening camp programs.

These ideas for incorporating environmental emphases into the undergraduate work of an elementary education program - while reflecting the facilities and faculty of a particular institution, can be implemented at other institutions. The key ingredients are:

1. administrative recognition of the importance of environmental education for all elementary education students;

2. faculty with interest and ability in working with students in the development of techniques and materials for environmental study; and

3. Cooperative school systems who have moved, or are willing to move, into providing environmental education for boys and girls.

Facilities-and-materials are not the critical factors in such a program; a realistic program can be developed in an urban setting, utilizing city streets and vacant lots and teacher-made equipment!

It is not suggested that this program will provide, for every pre-service teacher, an adequate background for teaching an environmental education emphasis in the elementary school. It has, however, enabled graduates of the Laboratory Approach to Teacher Education program to "open up" to the possibilities of vitalizing the elementary education program with timely and investigative learning experiences in the environmental education realm.

Additional ideas to be considered include:

1. study trips to alternative environmental education programs - with an emphasis on the adptation of the learning to the locale (inner city, lakeshore, rural, etc.).

2. Cooperative training program linking the resources of the university, elementary schools, and outdoor centers; one format might be a summer school for in-service teacher education utilizing an area nature center and staff - with classes for elementary school children over a two or three week period.

3. extension of the undergraduate program by the formation of an alumni group - with in-service meetings during the year at which members would share innovative teaching ideas and participate in study trips to creative environmental education study sites.

4. extension of the idea of a study site (the nature trail) by developing guides for teachers and pupils as they investigate various near-school habitats (environmental learning in a cemetery, ecological study of a city block, etc.).

5. establishment of an advisory community-school-university committee for environmental education for the guidance and encouragement of related programs in all area schools.

ATTITUDES AND VALUES IN ENVIRONMENTAL EDUCATION: THE FOREST OR THE FARM?

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Environmental education can take place anywhere. This does not mean, however, that some settings are not better than others. In our view, many outdoor environmental study sites and related curriculum materials do not place enough emphasis on the man-portion of man/environment, and as such, tend to be too forest oriented. We have come to question the value of the forest-study area, in light of the role of environmental education in the development of attitudes and values. In this same light, we have come to the conclusion that the farm is a much neglected environmental education resource.

Even though nearly all environmental educators would probably agree that man's relationship to his environment is the core subject of environmental education, much environmental education takes place where man is infrequently found in forests, in state parks, and in wilderness areas. Why is this so, when there are so many places where man can be found intensively interacting with his environment? More importantly, what subtle harm results from this practice with regard to one of the broadest objectives of environmental education, that of having students develop an understanding of man's place in the natural scheme.

We have observed that many environmental education programs and environmental curriculum materials often subtly depict man as separate from, independent of, and above the rest of nature. By subtle, we mean just that: an overall, quietly underlying, misalignment of perspective. Phrases in curriculum materials such as "man and nature" as opposed to "man <u>in</u> nature", the frequent use of "man made" as an antonym for natural, and the paternal, as opposed to dependent, relationships between man and other species which some materials seem to depict, illustrate the subtle nature of the misalignment to which we refer. We find that in too many environmental education curriculum materials, man is depicted as an ecological interloper. It may be that the same ingrained societal attitude the historian Lynn White described as stemming from our Judeo-Christian Ethic (1), the attitude that man is somehow independent of, above, and pitted against the rest of nature, has seeped into the fabric of environmental education -- in spite of a lot of rhetoric to the contrary. This must change. Although pollution is something bad done by man, it is also the waste of a natural ecological agent. Man must be shown to be in the natural scheme as an integral component. It is in this regard that we feel that the choice of study setting may be extremely important. Man does not live in the forest.

Some Positive and Some Negative Features of Forests

These are, to be sure, some very valuable lessons to be learned in the study of forests. Forests are part of the real world and certainly some basic appreciation for nature can be gained by examining forests. A basic need for "forests" by

man may well be the basis for the spiritual experiences most of us have had in the solitude and the beauty of a wilderness forest area. Trying to put this into perspective, we were reminded of the television program covering the trip by the singer, John Denver, to the Rocky Mountains -- the trip that inspired "Rocky Mountain High". Mr. Denver and his guide spent most of the hour creeping on all fours whispering to each other and peering over rocks at groups of mountain sheep and other wildlife. The thrill John Denver experienced there in the Rockies seemed to come in part from the fact that he was seeing things that man does not often see. In the forest we are interlopers, wandering in places where man usually is not found, places devoid of human impact.

Wilderness and forest will almost always have a significant role to play in the recreational activities of man and it is important to hold wilderness areas in preserve from a strictly ecological point of view. Forests contribute to the diversity of the environment and add to the stability to man's total environment. Most of the difference between a climax forest and the majority of the inhabited world is really a measure of man's impact on the environment. Students should see this and should be helped to appreciate it. Studens should be helped to see that land covered with forest is incompatible with "civilization". We are well beyond the point where man and wilderness can co-exist in the same place at the same time. Curriculum materials should avoid the treating of forests and nature as synonyms; they should guide students away from the following kinds of illogical associations:

- The forest is "unspoiled" by man, therefore the forest is "natural".
- "Natural" means "of nature", therefore if man has altered something, it is no longer natural.
- Nature is good.
- After man alters something, it is no longer good.
- Man is bad; he shouldn't alter anything.

Wilderness, woods, and abandoned fields constitute most of the environmental education study sites with which we are familiar. In these settings there is a danger that students will not associate the principles they see and learn with what they see in practice at home. The forest is different from what students experience in everyday life and they may well fail to make the transfer of principles to man, himself, back at home -- even if the connections are made skillfully by a teacher.

Is not the forest a place, after all, in which man does not interact with his environment? People visit forests; they hike and they may even camp for several weeks. They are not, however, permitted to pick flowers or chop down trees, and they certainly cannot cultivate things to eat during their short visits.

Perhaps there is too great a gap between the forest and our front yards. Doubters should be reminded that this certainly is true in miles; this fact alone is not insignificant to most school systems. But there in the gap -- in both the conceptual and in the mileage gap -- is the farm. This setting has not been explored to its full potential in environmental education in spite of the fact that it may well be the best place in which to learn how man relates to his environment. Students must be brought out of the woods literally and figuratively in order to see that environmental problems are not things that can be solved by totally <u>eliminating</u> man's impact. After all, there is no way that man can exist on this planet without having an impact. The farm is far more representative of the way the world really is. We leave the classroom to come into contact with the world: to seek, to study,

and to understand. It has been pointed out by many that the first step outside the classroom is far enough to find many of the things in nature described in textbooks. The question is, how far beyond the classroom must we go in order to find a representation of man and his relationship to his environment? We could take in the city or the community, but although this is a subject fit for study, the city is incomplete as a "system". We would have to go out one more circle to include the farm in order to have all we need to study. Beyond the farms lie the forests, those places man visits but where he does not "live".

Some Features of Farms

Because most farms have wood lots and ponds, because there are lots of farms, and because there are lots of farms near population centers, farms are logical settings in which to study all of the same ecological principles that one would study in the forest. But far more than that, the farm is the epitome of man interacting with his environment. The farm is where man plugs into the earth. Ecosystems studied on a farm are ecosystems with man included in them clearly. On farms students can learn how man relates to his environment by studying just that: man relating to this environment. No pedagogical device is necessary.

Consider the basic concepts and principles of ecology, those described by Kormondy (2) for instance, and how well the farm is suited to their consideration with man clearly in the picture:

Producers - Consumers - Decomposers - Could there be a more easily studied, made-for-learning example of the energetic and chemical relationships between ecosystem components, than the farm? On the farm there are cornfields full of primary producers, pastures full of cud-chewing primary consumers, and families made up of beef-eating secondary consumers--families that perhaps even spread manure back on the fields after decomposers have had a chance to perform their function.

Energy Flows Through Ecosystems - Where could this concept be better illustrated than on the farm, where productivity is the name of the game--where solar energy is converted into food energy, first in crops and then in the animals? The loss of energy between steps in food chains should be much easier to see on a farm than in a forest simply because the farm is basically a much simpler system.

Chemicals Cycled Within Ecosystems - Again, where could it be easier to trace a chemical than on a farm? Fertilizer is put on the field, crops are harvested, crops are fed to the animals, and, ideally, wastes are put back on the fields. If the last step isn't followed on a particular farm--if the chemical cycle is broken--more chemicals must be brought in from the outside--at great expense.

Succession - Farms usually have combinations of newly plowed fields, pasture, old fields, woodlots and an assortment of ponds in various stages of succession. Where could one possibly find a better place to study succession than on a farm?

Primary Production - If it is primary production one wants to study, corn fields and agricultural crops in general have twice as much of it going on, per unit time, per unit area, as a deciduous forest (2)--ten times as much as a lake or the ocean.

Eutrophication - There is no better example of over-feeding than the over fertilized farm pond in which eutrophication is the result of the accumulation of nitrogenous animal wastes or fertilizer.

These are but a few examples of how well the farm lends itself to the illumination

of principles of ecology. Ecology-oriented teachers could surely find many more such applications. Those interested in such topics as pond phytoplankton and field mice polulations will find that farms also have ponds, streams, old fields and woodlots.

Multidisciplinary Studies - All teachers know that children do not learn about their environment just by looking at it. They must explore it by touching, tasting, hearing, smelling, and then piece together the information they discover for themselves. The farm is a rich resource for textures, tastes, sounds, and smells. The spectrum of soil, seed fertilizer, germination, cultivation, growing plants, grain-eating cows and how these together produce milk offers a wealth of thought-provoking materials for students. Varied combinations of activities such as putting hands in the soil, feeding the cows and pigs, planting corn, digging potatoes, and pulling weeds can be provided in an abundance sufficient to tire most energetic youngster. Add to these all the things that normally can be done in a woodsy wilderness setting. And isn't the farm an ideal site for multidisciplinary studies? Gardens, farm animals, silos, etc. provide opportunities for the manipulation of numbers and lessons in mathematics. Mathematics and sociology can be combined in the analysis of the value of produce from the seed, through the middleman, to the market. Composition and writing can easily be made part of any visit to a farm. The growing of food encompasses areas of economics, geography and sociology. Where could it be better than on a farm to consider the worlds food and population problems for instance? The farm is an ideal launching pad for studies of nutrition, agriculture itself, home economics, chemistry, biology, and a host of other traditional subject areas.

We emphasize that the farms' forte has to do with pedagogy--the shortening of the distance between experiences and the primary concepts to be learned. The most important things to be learned after all are not that energy flows through ecosystems, or that consumers eat producers, or that water pollution kills fish, but that man is part of nature. He is as much bound by the laws of nature as a midge. Our position is that, in order to get this across, it may be better to look at food chains with milk, manure, cows and people in them than to focus on those systems dominated by may-flies, filiamentous algae, and moor hens.

Some "Ecological Short-Comings" of Farms

Surely no environmental study area is perfect, and the concept of the farm-study site is likely to have some defects. For instance, finding farms with farmers willing to host environmental education programs may be no small matter. However, the sub-heading of this paragraph should not imply that particularly glaring shortcomings were found. Rather, our aim is to point out that there is a lot to learn on the farm by way of bad example. Bad example, as we all know, can be one of the most effective learning devices and, unfortunately, bad ecological examples abound on the farm. The instability that comes with simplicity in ecosystems is clearly evident on the farm. Monocultures of corn, wheat and the like bring with them the need for energy-requiring maintenance in the forms of pesticides and fertilizers. Nearly every farm has an example somewhere of the result of the over-concentration of resources. A nearly ubiquitous example is the dairy farm feed lot. Another bad example is the eutrophication of farm ponds and farm streams. By providing a concentration of ecological bad examples, the farm provides a basis for studying all sorts of negative features of man's impact on his environment. These cover most of the spectrum of simplifying and upsetting balances,altering cycles, and pulling resources out of place.

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Summary

The point of view presented here stems from our experience with the King Environmental Education Center in Nazareth, Kentucky. The King Center is a resident environmental education center on the site of the former Nazareth College of Kentucky, a 1,000 acre facility that includes of all things, a 600-acre comtemporary dairy farm. Here we have seen many students tackle environmental problems in studies involving the farm and constructs related to it. We have seen teachers find their way easily through the principles of ecology using lessons written and developed for and tried on groups of students successfully. We have become convinced that the farm experience has a decidedly positive impact on environmental attitudes and values. We are also convinced that this approach can and should be developed elsewhere. Certainly no school system should neglect an outdoor program because of the lack of access to a wilderness area. Studying the outdoor, man-made environment, the farm in particular, will not only be convenient but also highly suitable.

The fact that most men see man as being detached from, and above the rest of nature, is the crux of a man-environment problem. This must be taken into account directly in environmental education. An effort must be made to present concepts and to design approaches in environmental education that put man in the picture. Since the farm and agriculture represent the most fundamental and easily understood aspect of man's relationship to the earth, the farm offers both an ideal conceptual framework and a physical setting in which to study man's relationship to his environment.

Agriculture brought man, the hunter, out of the woods more than 10,000 years ago and began the process by which, we arrived at our present state of civilization. And now, ten thousand years later it is time that man brought environmental education out of the woods.

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A RATIONALE AND PROCESS FOR PRIMARY LEVEL ENVIRONMENTAL EDUCATION

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The remarks made in this paper are based upon the conceptualization and implementation of the Primary Environmental Education Project (PEEP) (1) funded in 1972 by the Office of Environmental Education, HEW. The project was funded to explore a way to incorporate environmental education into primary school instruction in a systematic fashion.

The Problem

Writing in 1972 (2), this author felt that there were serious constraints to the integration of environmental education topics and activities in the schools. The first of these constraints was a lack of widely disseminated and well-articulated statements of the concepts, generalizations, and processes to be considered in a viable environmental education program. Although there may be disagreement as to whether we have functional statements in these areas today, there are a number of promising conceptual frameworks and methodologies suitable for primary level instruction. These statements, however, will do little to integrate environmental education into the curriculum.

It would appear that several other constraints continue to operate when one attempts to develop environmental education curricula.

Today--as in 1972--we still have not been able to illustrate on a national level, the interdisciplinary scope of environmental education, particularly in reference to congruences in cognitive and affective goals between this area and social science education or science education--to cite two examples.

Another constraint is found in the study schedule of primary school students. Most lower elementary school programs are structured to the extent that there is little time left in the day for teaching about subjects other than those of reading, language arts, and mathematics. Subject areas such as social studies, science, and the arts receive little attention in many curricula. The idea of adding another subject such as environmental education is easily rejected by curriculum coordinators and teachers.

Still another constraint is that much of the environmental education material for the young child has been awareness-oriented. Obviously, for this age level, these activities are essential. But we know that the young child is an "inveterate explorer and exploiter of his physical and social worlds, constantly seeking new challenges and solutions to the problems they encounter."(3) He is also much more aware of our world than we sometimes acknowledge. Exposure to media has been more intense during his early years than it was when his parents were young. John Culkin writing a number of years ago sums up this phenomenon in this fashion:

> A lot of things have happened since 1900 and most of them plug into walls. Today's six-year-old has learned a lot of stuff by the time he shows up for the first day of school. Soon after his umbilical cord was cut, he was planted in front of a TV set 'to keep him quiet.' He liked it enough to stay for some 3,000 to 4,000 hours before he started the first grade. By the time he graduates from high school he has clocked 15,000 of TV time and 10,800 hours of school time. He lives in a world which bombards him from all sides with information from radios, films, telephones, magazines, recordings and people. He learns more things from the windows of cars, trains, and even planes. Through travel and communication he has experienced the war in Viet Nam, the wide world of sports, the civil rights movement, and death of a President, thousands of commercials, a walk in space, a thousand innocuous shows and, one may hope, plenty of Captain Kangaroo. (4)

We also know that a child, during his early years in school, has the capacity for achieving skills and knowledge objectives which we normally reserve for his later years of schooling. Environmental education materials need to be made action-oriented. The point I wish to make here is that in the absence of a sequence of activities leading from the awareness to the action stage, much of the effectiveness of an environmental education program is lost for the student soon becomes disinterested.

A final constraint to program development lies in the lack of realism provided in a program of study. All too often, environmental education consists of an occasional reference to an environmental problem presented in the school weekly paper or a sporadic teacher observation of an environmental issue that has commanded national attention. Students are not helped to see how they are affected in their immediate life-space by the exploitation and mismanagement of the environment, in spite of the fact they have the intellectual capacity to begin to understand environmental management problems as well as the motivation to want to do something about them.

THE PROCESS

"Finding Time During The Day"

If one examines the primary school curriculum, he will be struck by the amount of time accorded to the three R's. As literacy is a major educational objective for the schools, it is understandable that the curriculum must seek to develop these skills in each child. There is time, however, allocated to the social studies, science, and the arts. Quite often, this time is used for more language arts experiences, computational practice sessions, etc., as many social studies and science programs are not well-conceived.

When PEEP is introduced into a school, we ask for that portion of the school week allotted to the social studies and science program. During the exploration

and orientation stages of implementing PEEP, we will illustrate the congruences among environmental education, social science education, and science education objectives. The following example illustrates a sample of these congruences:

Congruences in the Conceptual Framework

Two key ideas brought out in an environmental education program are those of interdependence and interaction. Let us examine if these ideas are also important in other subject areas.

In a statement from the California State Central Committee on Social Studies we read, "The social studies are here defined as that portion of the curriculum which deals specifically with man in his dynamic relation to his physical and social environment. Among the concerns of the social studies are a knowledge of how man is influenced by his environment, and how he, in turn, uses his environment to satisfy individual and group needs. (5)

In a presentment of cognitive understandings developed in a newly published social studies series, we read, "Children explore their individual relationships with, and their feelings and beliefs about, the natural environment and their dependence on it. Children go on to consider the human capacity to use and change the natural environment through the medium of culture. They explore their responsibility to other life on earch." (6)

Turning to the area of science we can find similar statements. From a statement of a nationally known elementary science curriculum, we read, "Central to modern science, and therefore to this program, is the view that changes take place because objects interact in reproducible ways under similar conditions . . . . By interaction we refer to the relation among objects or organisms that do something to one another thereby bringing about a change." (7)

Some of the major scientific concepts included in this program are organism and ecosystem. In their study of organisms, children observe how plants and animals interact with one another and with the soil, atmosphere, and sun in the vast network of relations that constitute life. (8)

Viable environmental education programs are extremely concerned with the development of intellectual and problem solving skills. These are also identified as primary objectives for other areas of the curriculum.

From a major social studies curriculum development project of the 1960's, we read, "The student will become increasingly skilled in organizing and analyzing information and drawing conclusions. In this process he:

1. Identifies differences in data
2. Classifies data
3. Generalizes from data
4. Tests hypotheses against data." (9)

From a social studies series, we find the following stated objectives:

The student will develop the following skills in processing information:

Comparing
Classifying
Conceptualizing
Inferring
Hypothesizing
Imagining
Evaluating (10)

In the area of science education we can find similarities. From a current science education text, we read, "Regardless of whether a scientist is a biologist or a chemist or a physicist, he spends much of his time engaging in the processes of inferring, predicting, controlling variables, etc. These processes must play an important part in any elementary science program." (11)

Further reinforcement can be found in statements describing a major science education program developed in recent years. "Science is what scientists do. The program is designed to enable the children to acquire competence in the processes that scientists use--the processes of science. In learning what scientists do, the children become highly involved in using the processes of science. The basic process skills that are emphasized are:

Observing
Classifying
Communicating
Predicting
Inferring

Because scientific knowledge is increasing so rapidly, it is impossible for students to learn everything. Our approach is to equip each child with competence in the intellectual skills, or processes of science, in order that he can find solutions to problems he may find in the future . . . " (12)

Once the similarities among subject matter objects are thoroughly explored by teachers and curriculum coordinators, it becomes easier to design and implement environmental education in the schools.

"Making It Real"

Nothing arouses and motivates a child more to action than becoming aware of a problem that involves him. Accordingly, PEEP activities were designed around life-space of the child. Most, if not all, of the environmental topics selected for the instructional sequence should be generalized to larger populations. Our concern, however, was to find those problems and issues in the child's territory. In order to accomplish this, we mobilized the available resources.

An important procedure to follow early in the development of an environmental education program is to establish a group which will be charged with the development and evaluation of the program. In addition to school personnel, this group should include community representatives.

In order to provide mechanisms for the maximum involvement of the community, the committee must include citizens who have an interest in environmental

quality problems. It should be noted that every community has interest groups which work toward improving the social, physical, and biotic conditions in man's environment.

Furthermore, this coordinating committee should have some members who are parents of the children involved in the environmental education effort. This provides an important mechanism for strengthening curriculum development activities.

Two important assumptions underly this consideration. First, it is felt that more realistic teaching-learning situations and materials can be provided for the child if the parents are involved in the identification of content vehicles to be utilized in teaching environmental management concepts and generalizations. Parents who are aware of environmental needs in their home and neighborhood settings are of inestimable value in helping select content for the curriculum. Secondly, the utilization of parents represents a realistic approach to a home-school partnership that can strengthen the bond between the family and the educational establishment. In the normal course of the school year, there are many opportunities for the parents to reinforce ideas and skills being developed in the classroom. Parents can, in effect, assist more naturally in the teaching-learning process as they interact with their children in the content of the home.

The identification of interested individuals in any community is a relatively simple task. Interest in environmental problems has quickened in recent years to the extent that individuals and groups have formed in every community to publicize and/or combat mismanagement of the environment. As many of the groups represent the middle socio-economic stratum of the community, care should be taken in the selection of committee members in order to obtain representation of the total community.

In PEEP, the Athens Model Cities Program personnel were helpful in identifying environmental concerns of residents in public school areas. Parents involved in the Model Cities "Green Thumb" project assisted in identifying case studies in these areas that might be selected for the curriculum.

The next phase of parental involvement in PEEP, other than traditional involvement in organizations such as the PTA, was planned by the manner in which some of the child's learning experiences were structured. In the modules there are learning experiences that involve the home and the neighborhood. Whether it be data collecting or an action project to improve the home or neighborhood environment, an attempt was made to involve parents and other adults in the child's social environment. Parents were asked to help in data collecting or in providing materials usually found around the home. This type of parent involvement coupled with the usual school-community system of communication (PTA, special events, etc.) served as a continuing source of feedback during the project.

In summary, the involvement of representatives of the total community is essential for the successful development, implementation and evaluation of an environmental education curriculum.

Primary level environmental education programs are feasible--and successful--if the activities are geared to the realities of the curriculum and the child's life. It is hoped that the suggestions offered in this paper will be helpful to those wishing to promote environmental education for primary level students.

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THE HIGH SCHOOL HISTORIAN AS ENVIRONMENTALIST

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In this paper I am suggesting an environmental approach to what goes on in the high school history classroom. I will proceed through three stages, first outlining my understanding of what constitutes "environmental" history. Second, I will suggest ways in which the teacher can retrain himself or herself for the environmental approach to history teaching. (I have chosen to do this by including a previous paper, "Notes On Getting Started In Environmental History", Environmental History Newsletter, Vol. III, No. L, March 1976, and available from the Department of History, Duquesne University, Pittsburgh, Pennsylvania, John Opie, editor.) Third, I will suggest some learning goals, learning activities, and appropriate source material for environmental history.

I believe we are at a turning point in the long story of man's interaction with the rest of nature. If you will look at the growth curves for the past 75 or 100 years, you will see changes of scale that are unprecedented. Look at the trends in population, energy use, toxification, wildlife extinction, materials depletion, solid waste, water use, communication/transportation, the destructive power of weaponry and, on the encouraging side, at the growth of knowledge in the field of ecology. We have learned from ecology and related sciences that the geobiotic life-support systems which make up our bodies and their environment cannot tolerate much further growth in these negative trends. We have learned about the interdependence of environmental systems and the consequent chain-reaction characteristics of environmental degradation, and we have learned about the fragility and the subtleties of the biosphere. We may conclude that the patterns we see in recent history cannot and will not continue. Major changes lie ahead for us, and surely for our students. Recent trends will either be discontinued by rational coice and conscious planning, or they will discontinue themselves by way of any one of a dozen conceivable biosocial catastrophes. The question before educators is how to prepare ourselves and our students for knowledgeable action.

The study of history is a crucial part of that preparation. A knowledge of history gives a sense of perspective on recent changes, showing that the intensity of man's negative impacts on the biosphere is an aberration from historic patterns (as is the unprecedented "high" standard of material wealth that obtains in some regions and the "overheated" economies of the developed nations). A knowledge of history is a stockpile of alternative man-environment systems which, while they cannot be repeated, can be used by the student as building blocks for the construction in his own mind of a viable alternative to a man-environment system he can see is doomed. The study of history also gives us a set of exemplary biosocial disasters showing what heppens when man violates the laws of nature. Furthermore, when the environment is studied from a historical point of view, the student gets to see that cultural factors, i.e., ideas and institutions, are just as important as geobiotic factors. (A generation trained only in the environmental sciences might know nature very thoroughly, but at the same time be clumsy and inept at reforming attitudes and institutions to make them harmonious with nature. The social sciences and humanities complete the education begun by the natural sciences.) Also, environmental history provides an introduction to some basic laws of man-environment systems. Finally, the experiences the student may have in the environmental history classroom can help

develop the behavioral skills he or she needs to participate in the processes by which American society is readjusting itself to reality.

Environmental history is the history of the human habitat. The world inhabited by man includes the unchanging aspects of nature, nature as man has modified it in the creation of landscapes and products, man's technology as it is applied to nature by labor, the world of social institutions, and the world of ideas. Man creates his habitat, his environment, by interacting with and partially modifying nature. Environmental history features a holistic approach and stresses the interrelationships between the parts, for example, between ideology, technology, and the urban landscape. It stresses the limits each part may place on the development of the whole. Environmental history rests on knowledge about the natural world, including ecology, geology, physical anthropology, and related disciplines. It includes many of the traditional fields of history such as economic history, intellectual history, the history of science and technology, urban history, agricultural history, demographic history, and so forth. It stresses man's modifications of the biosphere as these have permitted the development of man's very special role as the ecological dominant and the director of evolution. It also stresses these modifications as they have accumulated to the point where they may imperil our special relationship to nature by imperiling nature itself. Environmental history illuminates the links between man and the biosphere at all stages of history and provides perspectives on the present. It seeks to explain the origin and development of the present environmental crisis and of the cultural resources available for our response. What kind of retraining is necessary to teach an environmental approach to history?

[Cf. "Notes On Getting Started In Environmental History"]

The teacher as a source of information, a research guide, a facilitator in discussions and the authority providing and orderly learning situation is one crucial component in the classroom environment, but only one. There are four others. There are, first, the other learners, the students, considered as individuals with social and psychological needs which must be satisfied if learning is to occur. Second, is that which is to be learned, the information, concepts, values, and skills which will inform the behavior we are trying to shape. Third, is the learning environment, both the classroom and the outside community. Finally, there are the learning activities. These five components comprise the total experience of the environmental history class and it is the total experience which the teacher must consider and manage.

What learning goals are peculiar to environmental history? What do we want environmental history students to be like when they "come out"? What do we want them to know and to be able to do? (Remember, we are not teaching environmental history, we are teaching people the valuable results they can derive from studying environmental history.)

The following list of concepts form a conceptual web reflective of the biosocial web in which we live.

1. Sense of continuity with the past. We are literally our past. The atoms which make up our bodies and everything else were once part of an exploding star. The materials out of which the biosphere is made remain the same. The forms change, but only slowly. We are the contemporary expression of historic experiences.

2. Sense of history, i.e., development through time, evolution, cultures, landscapes, perceptions of nature, technologies do not spring up full

grown, but rather emerge incrementally through time, just as do species and ecosystems. The web of life extends backward in time.

3. Sense of man's uniqueness within nature, rather than man versus nature. The historical evolution of culture has been man's adaptive device. Man is in nature and of nature but he is more. He is what Chardin called "the ascending arrow of evolution".

4. Sense of timeliness. Certain periods of history witness greater change than others, witness turning points. These are historic opportunities for change, just like the present period.

5. Sense of identity and wonder.

   A. As a species, a sense of man's evolving place in nature, and,

   B. As an individual, the student's own sense of place in nature and time, inheritor of a biocultural tradition that is full of problems, challenges, opportunities, and beauty; a sense of the wonder of it all ("I am this kind of creature, at this point in time and at this point in the evolution of my own knowledge about myself and my environment.")

6. Sense of adventure. Man is open-ended, still evolving, still creating new worlds, new cultures, new environments. ("I am too, helping to create and shape overall environments and choosing my own life style within them.")

7. Sense of danger. Some historic man-environment systems have exceeded the limits of their life-support systems and have become extinct or have witnessed a degraded quality of life. No system, including ours, is guaranteed success.

8. Sense of Alternatives to be found in the great variety of man-environment systems that existed in the past, and in the present. We are not condemned to playing out our current story line to its tragic end. There are other ways to interact with nature.

9. Sense of optimism, the record of environmental history does include successful efforts in which the course of history was turned away from biosocial degradation toward a higher quality of life.

10. Sense of achievement from having changed one's internal environment, one's mind, from having clarified one's own values and from having learned how to learn and how to teach.

11. Sense of enjoyment, of viewing the past as entertainment, as an avenue of intellectual escape, as a puzzle.

In summary, the student should be aware that everything has a history and is the culmination of its history. Anything the student can see is the result of man's interaction with nature or of natural evolution. And anything the student can see is but one strand in the evolving environmental web.

What skills do we want to develop in order to graduate people who have self-confidence enough to participate in the public debate and decision-making? Three kinds of skills can be taught in the environmental history classroom:

learning skills, evaluating skills, and participating skills. Learning skills, how-to-find-out skills, include listening, seeing, reading, touching, asking and answering, researching, and modeling. These are the ways in which we gather information, and if we expect adult citizens to be effective gatherers of information about environmental issues, then we must build them into the school experience. Method is as important as content. The students need to know the list of skills they are expected to acquire just as they need to know the list of concepts they are supposed to understand, in advance.

The second group of skills, evaluating skills, includes thinking and feeling. Students need experience at thinking and meditating, at mulling over what they have been exposed to. They need to puzzle out relationships, answering "what does it mean for me?" and "how do all the parts fit together?" and "how has it changed through time?". And, students need practice in feeling, in developing emotions, in assigning values to particular life styles or aspects of the environment. The most fruitful line of questioning I have experienced in getting enthusiastic discussion underway, is to ask students, "How do you feel about...?"; "What are your emotions?". Frequently, students will initially respond with what they know or think -- they are surprised to find out that their feelings are important in a learning situation. And yet, in life, what we learn best is that about which we are the most.

The third set of skills are the how-to-convince and to participate skills. These include listening to and appreciating the other point of view, public speaking, discussion skills, letter writing, telephoning, documenting, running a meeting, and organizing an environmental defense campaign.

In the final part of this paper I suggest some sample learning activities which are organized around the concepts and which provide skill-building experiences.

First, I would distribute and discuss these learning goals with the students. Get their evaluations. How do they feel about them? Let them modify these goals and let them suggest activities. Second, I would distribute copies of the following reminder and the list of standard questions which can be applied to any subject in environmental history. The reminder is, "Whatever you do, you do it in, with, and tothe environment. Whatever has been done in history has been done in, with, and to the environment". The list of standard questions:

1. What are the environmental origins of this material or activity?

2. What are its biotic and social impacts?

   A. Which of these impacts are costs? Which are benefits?

   B. Do benefits outweigh costs?

3. What is the historic trend?

4. What do we project that the trend will be in the future?

Third, I would involve the students in preparing some kind of visual disply of these concepts, say, posters to go up on the wall. While they are cutting, lettering, painting, and gluing, involve them in applying the standard questions to the poster materials they are using. Do not be afraid to let the questions run into technical areas where you do not know the answers. One of the valuable lessons to be gleaned here is that we do not know the chemical nature nor the biotic impacts of materials in our daily environment and that this kind of

ignorance is a relatively recent phenomenon. Most historic peoples had wholly organic technologies and knew what they were using.

What can you do to teach students a sense of personal continuity with the past? One, hold a seeing, touching, asking, and answering session about things the students have with them; e.g., their books, notebooks, shoes, buttons, desks. Have some students bring in some coal, motor oil, limestone, wood, soil, cement, grain. Bombard them with the questions: "Where did this come from?, When was it formed?, What was it before that?, and before that?, What changes has it gone through?, How do we use it?, What has man done to it?, Where is it going next?, Where will it be in 100 years?". Two, read aloud pertinent passages from Daniel Kozlovsky's book, Toward An Ecological and Evolutionary Ethic where he sums up man's material evolution. It is the best statement of our biophysical continuity in the literature. Three, have students read for themselves some pertinent passages from Herman Hesse's novel, Siddharta, or the whole novel. Four, lecture briefly on the law of the conservation of matter and energy. Explain how our supply of atoms is constant and that in successive phases of history they are used over and over again, combining and recombining in different forms. Five, have students do an evaluation/meditation session in class, keep it short (ten minutes is a long time for high school students to sit and think in a classroom environment). Follow with a sharing activity; have them write a letter to an imaginary pen pal explaining what they are learning in class. Collect, clip off the signatures and share the letters by sending them through the U. S. mail to the individual students at their homes. Be sure they include in the letters how they feel about what they are learning.

The following activities are designed to convey a sense of the historic succession of environments. One, lecture briefly on biotic succession and climax stage of the great American forest, the forest environment as the pilgrims found it. Two, have a few students prepare a model of that forest in a four-foot square box, using plaster, twigs, etc. Let them put a lot of work into it. Three, have a second group of students redo the landscape by cutting small clearings and establishing log cabin farmsteads. Four, have another small group clear cut the entire forest and construct a large, modern agricultural operation, introducing machinery and chemical additives. Five, have a final group pave over the landscape and erect a shopping center and an oil refinery. At each stage, let the students feel the frustration of seeing their work destroyed. Six, hold a discussion session on what was lost in the historic succession, by way of 1) species, 2) landscapes, 3) materials, 4) biotic health, 5) quality of life values. What was gained? Make them define their terms. Have some of the more advanced students read Loren Eiseley's Immense Journey. Let them go and explain what they have read, and the wonder of it, to the office staff, or the PTA. Get them out of the classroom.

A sense of timeliness, danger and of turning points can be conveyed in the following activities. Pick out one of the great biosocial crises of the past, perhaps the Dust Bowl of the 1930's, the arrival of the pilgrims on what seemed to them to be "hostile" shores, the Black Death of 1348, the dessication and death of the fertile crescent civilizations of the ancient period, and research it thoroughly yourself. Have the students research the period and prepare a chronology and a list of causes and effects. Then arrange a role-playing session around the crisis. Depending on which situation you pick, have the students become peasants, priests, merchants, city-dwellers, bankers, members of the governing aristocracy, etc. What are their responses to the crisis, and what quality of life demands do they make upon one another? Who is responsible for the crisis and what can be done about it? Have them describe how their quality of life is being degraded. Still playing their roles, have them sit down and write letters to their contemporaries in distant lands, to their governors, to the future. Perhaps, as in the case of the ancient agricultural civilizations, it would be fruitful to have them compose prayers to the

agricultural deity. Have each student plant several bean seeds. A few days after they germinate, stop watering them. Watch them die. Discuss drought and famine in history.

For a sense of adventure and alternatives, have the students research and read about the great transition from hunting to agriculture; it was the most radical change in man's environmental history up to the chemical and energy revolution of modern times. Discuss agriculture as an energy-capture revolution. What were the benefits? What were the costs in independence, landscape, naturalness? Noted environmentalist Paul Shepard argues that agriculture is an ecological disease and the agricultural revolution started man on a collision course with nature. Overpopulation and pollution are the results of agriculture and the only hope for harmony between man and nature, and for the very survival of man, is to return to a hunting and gathering relationship to nature. Do your students agree? (Cf. Paul Shepard. The Tender Carnivore and the Sacred Game, 1974).

For a sense of alternatives, have students prepare models of different historic environments such as primitive hunting and gathering, advanced hunting and gathering, village agriculture, ancient urban agriculture, the medieval, feudal relationship between man and nature, an industrial slum from 19th Century England, a frontier farm in early American history, stressing self-sufficiency, a late 19th Century American market farm stressing the domination of the railroads, etc. Each model should include descriptive texts, a physical model of the landscape, drawings, and a list of values to be found in that environmental system. Then have a debate with each group trying to convince the others to give up their own real life environment for the one represented by the historic model. Encourage a conflict of opinions. Follow with a general exercise, such as letter-writing, making entries in a mock diary, making a tape recording of one's thoughts and feelings, in which the values perceived in previous man-environment systems can be realized in our own time, by modifying our own environment.

For a sense of danger, struggle, optimism and realism, have the students research and reenact the struggle to set up the National Park System, a victory for conservationists, and then the battle over Hetch Hetchy, which was the first big loss for wilderness preservationists. Have a debate between Gifford Pinchot and John Muir, or have each testify before the Senate Committee and have the students, acting as the Senate, reenact the vote. If they vote to preserve Hetch Hetchy (going against historic fact), have them analyze why their position is different. What has happened in the intervening decades? Have them write letters to Wilson urging that he veto the Bill.

There are as many kinds of learning activities as there are historic events and social processes in the real world. Get your students to learn to do the things they will be required to do the rest of their lives.

In addition to these kinds of learning activities, I would require a text, for continuity's sake. W. M. S. Russell has authored the only text aimed at secondary students. It is titled Man, Nature and History and is available from Natural History Press. Also, once you get students hooked on your class, you might introduce some more traditional exercises, namely, term papers. Have them prepare papers, or oral presentations, on the history of pollution, conservation, land use, population, shelter, energy use, agriculture, the quality of life, etc. Make them stress quantitative information and the changes in the quality of life associated with each history.

Finally, I suggest you become acquainted with the American Association for Environmental History, now being organized under the leadership of Dr. John Opie.

Membership in the association will carry subscription privileges to Environmental Review, a quarterly stressing the humanities and the environment, with special emphasis on history. One of the major services of ER will be to gather together a bibliography of environmental history materials for use at all levels.

Why teach environmental history at the secondary level? Because students are the products of that history; they live in a world of integrated social, biotic and resource systems. Moreover, these systems are integrated none-too-well, giving rise to problems which arouse their daily attention. These systems have come to be what they are through time, and can be better understood and confronted by seeing their historic growth and development. Citizens who understand only social issues will be as ill-prepared for civic responsibility in an age of resource scarcity and environmental pollution as are citizens who understand only the natural sciences. Environmental history integrates the two, making one citizen with a sense of historical possibilities.

THE DEVELOPMENT OF A REGIONAL ENVIRONMENTAL EDUCATION CENTER

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The boundaries of Michigan's Upper Peninsula are determined by Lake Superior to the north and Lake Michigan and Northern Wisconsin to the south. Predominantly rural, its largest city, Marquette, has a population of 25,000 with the Peninsula's total population being slightly more than 300,000. The Upper and Lower Peninsulas are connected by the Mackinac Bridge which spans the Straits of Mackinac. Travel from Sault Ste. Marie on the east end of the Upper Peninsula (U.P.) is a full-day's trip of over 300 miles to Ironwood on the west end.

The U.P.'s natural resources include clear air, two freshwater lakes which rank among the world's largest, abundant forested areas with yet a few stands of virgin timber, minerals underfoot, and lakes and streams that still run clear and clean. At the same time, however, the frequency and intensity of demands being placed on these resources are rapidly increasing and the integrity of the environment is not always maintained in the process. Yet, environmental education is not a common component in our schools. In response to this problem the author, with James Mansfield of the School of Education, initiated the development of the Regional Environmental Education Center of the Upper Peninsular (REECUP) at Northern Michigan University. We saw a need for Northern to reach out in response to the long list of needs voiced by teachers throughout the region. We were further encouraged by recommendations made by the Governor of Michigan's Environmental Education Task Force[1] including the establishment of regional environmental education centers.

With the general goal having been identified we next faced the task of finding financial support. During the fall of 1973, the Cliffs Foundation, through the Cleveland Cliffs Iron Company, solicited proposals for funding from Northern's faculty. Our first proposal, requesting funds to conduct a study to determine the feasibility of developing a regional environmental education center for the U.P., was granted in January 1974. A second proposal to the Cliffs Foundation was funded July 1975, and a third proposal has been submitted. Funds obtained from these grants are being applied to two distinct facets of REECUP -- development of programs and development of an instructional facility in a remote forested setting on the Greenwood Reservoir. Construction is planned to begin during the summer of 1976. The buildings themselves will serve as instructional aids because they will include features for energy conservation, alternative energy sources, and non-polluting sewage treatment facilities.

Following are the five major goals of REECUP with examples of some accomplishments since the inception of the Center two years ago.

1. <u>To develop and disseminate learning materials for use by schools and others involved in environmental education</u>.

   Kits composed of printed materials, solicited from business, industry and

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[1] Governor's Environmental Education Task Force. <u>Michigan's Environmental Future: A Master Plan for Environmental Education</u>. Lansing: Office of the Governor, 1973.

governmental agencies, have been developed using basic themes such as water, air, land, solid waste management, etc. The kits are loaned to teachers and/or students wishing to use them. Modular programs produced by us and other local individuals and groups are made available as resource materials. They also provide examples for persons wishing to develop their own modules. Examples of slide-tape programs, produced by the author, include The Spruce Bog, Aquatic Insects, and Local Environmental Problems. Presently, Steven Gill, a graduate student at Northern, is developing a module on edible fall mushrooms which will be made available through REECUP. Several slide-tape programs on field techniques (e.g., measuring BOD, collecting aquatic organisms, measuring the pH of lakes and streams, etc.) have been made available to REECUP. These programs were developed during NSF Summer Institutes through the University of Wisconsin for secondary science teachers.

2. To provide training in the methodology of environmental education for all persons involved in the instruction and guidance of youths.

REECUP has provided the impetus for new programs in environmental education at N.M.U. For example, three new courses, developed by the author, were recently approved for inclusion in the biology department curriculum. Environmental Education: Curricula and Methods was offered for the first time during the 1976 winter semester. Environmental Education: Outdoor Activities will be offered during the 1976 summer session and Environmental Education: Investigating Your Environment during the fall semester. These courses are designed for in-service and pre-service teachers, K-12, but students pursuing other careers are also welcome to enroll.

REECUP, in cooperation with the Michigan Environmental Education Association and the Marquette-Alger Environmental Education Council, has conducted workshops, provided curriculum materials with instructions for their use, and coordinated a weekend conference. The conference, held in September at Northern's Cusino Lake Field Station, attracted participants from all parts of the U.P. The program included sessions on beekeeping, alternative energy sources, archeology, winter camping, orienteering, predation games, riddle walk, and astronomy. Due to the very favorable response received from the participants, the fall conference will be held again in 1976.

3. To coordinate environmental education programs and activities occurring throughout the region.

Meetings have been held with the Michigan Department of Natural Resources Regional Staff, the Director and staff of Pictured Rocks National Lakeshore, and the regional coordinator of the Michigan State University Extension Office. The purpose for these meetings was to discuss ways of mutually supporting each other's efforts in facilitating environmental education.

The author is the Regional Coordinator (Region I) for the Michigan Environmental Education Association and works with three district directors (Eastern, Central, and Western Upper Peninsula) to stimulate local interest and activity in EE.

At a more local level, there has been established the Marquette-Alger (counties) Environmental Education Council. Members include classroom teachers, 4-H leaders, school administrators, intermediate school district board members, college students, university professors, and employee of

the Michigan Department of Natural Resources, a member of the county Resource Conservation and Development Council, a U. S. Soil Conservation Service agent, and a member of the Governor's Interim Committee on Environmental Education. With the Marquette-Alger Intermediate School District Office as a base of operations, the Council has already been responsible for conducting workshops, purchasing equipment and curricular materials for use by teachers, and distributing a newsletter, the EE Catalyst, to all schools in the two counties.

REECUP is helping to provide financial and technical assistance to a group of students working on an alternative energy project. REECUP has also agreed to work with the Alger-Marquette Community Action Board on a joint alternative energy program.

4. To provide consultation services for those involved in the development of EE programs and activities.

Two Marquette ladies developed an instructional module, "Wildflowers Protected by Michigan Law", which was presented to elementary school children. The program includes a wildflower coloring book, printed information, and slides of flowers photographed by the husband of one of the women. Teachers who had seen the program expressed a desire to have several sets duplicated for each elementary school in Marquette. With financial assistance provided by the Marquette-Alger Environmental Education Council, REECUP duplicated the slides. Plans are to provide a set for each school district in the two-county area.

Other examples of assistance which have been provided by REECUP have been workshops for teachers wanting to develop outdoor laboratories on or near their school site and for teachers preparing to take their students camping.

A variety of curricular materials related to environmental education have been purchased. Consequently, REECUP can provide a media center where teachers may examine materials prior to purchasing them for their schools. Workshops are also provided for groups wanting to learn how to use the materials, and they are available for examination by undergraduate preservice teachers.

5. To encourage community participation in environmental education activities.

In addition to examples of activities stated for the first four goals, teachers are encouraged to enlist the aid of parents and other interested lay persons when conducting environmental education experiences. The community provides a sizable list of expert resource persons capable of addressing a variety of environmental issues.

A resource guide to places where field excursions may be taken for science, social studies, language arts, art, and other subject areas has been compiled. The guide includes suggestions for how the site may be used, e.g., a social studies field trip to the sewage disposal plant, plus logistical information such as whom to contact, limitations on group size or age, hours of operation, and entrance fees where applicable. The guide is provided free to persons requesting a copy.

In cooperation with the biology department at Northern, REECUP is soliciting funds from individuals and groups throughout Michigan to obtain money to pay for the

mounting of an eastern timber wolf by a qualified taxidermist. The wolf, recently killed by a rifle wound, was found near a highway in the Upper Peninsula. The mounted specimen will be used for educational programs on endangered species conducted throughout the region.

Conclusion

Upper Peninsula schools generally do not employ curriculum specialists with the specific responsibility of providing help to classroom teachers in areas such as science and environmental education. Through REECUP, we are attempting to provide that kind of help.

Many schools across the nation are blessed by having access to excellent environmental education centers, nature centers, or outdoor education centers. However, many schools are located in areas where such help is not readily available and are in need of some kind of facility to initiate and coordinate environmental education programs and activities. The model provided by the Regional Environmental Education Center of the Upper Peninsula may be of value for those trying to overcome this problem.

I believe any group committed to environmental education can develop a center in their community. It need not cover a large geographical area, such as REECUP does, but can serve local needs such as a county or even one school building

In order to raise the funds to get started, a proposal may be submitted to the Office of Environmental Education, HEW, Washington, D.C.; however, competition for these funds is stiff, and a higher probability of success will accompany a search for help in the local community. This may mean writing a proposal to a local industry, as we did, or asking for help from local service clubs and other groups which we have also done with some success.

We have a long way to go before all the goals of REECUP are accomplished. Some new goals may be added and present ones revised. In the meantime, we believe the kind of environmental literacy needed by the public, the need for understanding--for environmental education--is being significantly enhanced by the Regional Environmental Education Center of the Upper Peninsula.

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ENVIRONMENTAL EDUCATION: ITS ACCEPTANCE, INTEGRATION, AND IMPLEMENTATION

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Environmental Education: A thematic approach with three-pronged integration is a Title III ESEA project funded by the Illinois Office of Education. We are not in the process of developing a revolutionary approach to environmental education any more than any of dozens of programs across the country. What we are trying to do is make environmental education a part of more classrooms. We are attempting to reach the eighty percent level in terms of acceptance, integration, and implementation. On the surface this does not sound like much of a goal but what it means is that at the completion of the project funding, three years, eighty percent of the target population will have accepted the concept of environmental education, integrated it into their classrooms, and implemented the activities on a regular basis.

A natural question at this point is why only eighty percent; why not every teacher? In research on innovation, Rogers (1962) has identified five segments of an client group:

Innovators	2.5%
Early adopters	13.5%
Early majority	34.0%
Late majority	34.0%
Laggards	16.0%

Of these five, only three have any real import for innovative programs: the early adopters (13.5), early majority (34), and late majority (34) for 81.5 percent. The innovators are excluded because they represent a percentage which any innovation, even if of marginal worth, will be able to recruit. The laggards are also excluded because they represent a group of closed, traditionalists who see no merit in any type of change.

The remaining group represents those teachers who are open, logical, pragmatic, and experienced. They also represent the group that, once convinced of merits of the program, will adopt it and use it until something better comes along.

Based upon this goal and these client groups, we decided upon an implementation plan tailored to their needs as we saw them:

1. Attractive, clearly explained materials
2. Brief and concise in-service program
3. Low teacher preparation time
4. Reasonable cost
5. Continuity and administrative support
6. Statistical evidence of success

MATERIAL FORMAT

The first problem dealt with was organization and packaging of the materials to be given to the teacher.

We were committed to the idea of concept areas with underlying understanding statements because of prior experience with Dr. William Stapp of the University of Michigan. However, to broaden the scope and increase the depth of coverage we added additional concept areas for energy and economics to go with the areas of ecosystems, population, technology, environmental decisions and environmental decisions and environmental ethics. We also modified the grade divisions to meet our regional needs: K-2, 3-5, 6-8, and 9-12, respectively.

The use of readily identifiable concept areas makes it easier for the classroom teacher to deal with them as they relate to the typical public school disciplines. For example, a social studies teacher can find a reason for dealing with technology, economics, or population without worrying about having to exclude any of the important social studies concepts. The concept-understanding format also facilitates the development of specific materials for use by the classroom teacher which go beyond ideas and suggestions

To encourage teacher use we have packaged all the materials in 8½ x 11 format with attractive and informative covers. The teacher can select a booklet and applicable unit in four simple steps:

1. What concept do I want?
2. What is my subject area?
3. What topic/skill within my subject area?
4. What unit within my topic?

After these four steps the teacher will have selected three or four units from a group of more than 400 individual units.

Examination of the units will reveal a behavioral objective, materials list, detailed procedure, discussion questions, and a few suggestions for evaluation. If the teacher wishes to pursue the area even further, there are even suggestions for activities which build upon the main activity.

IN-SERVICE

In spite of the obvious clarity of the materials there is still a real need for in-service training for the target group.

We have developed a ten-hour program which is conducted in two five-hour blocks with eight to twelve weeks between the two sessions. This divided session format is a result of the experiences of out pilot program.

We were forced to conduct our in-service program in one week of 25 hours duration prior to school in the fall. Despite the time we had and the detail in which we examined the program and materials, the teachers just did not know what questions to ask or how deeply they were getting involved. Their evaluations of the program and the in-service were glowing but they did not really believe us when we told them it wasn't going to be easy. As a result they are now experiencing difficulties which we must ameliorate for them on a weekly basis.

The ten-hour in-service program does not give the teachers a graduate course in environmental education, but it does motivate them to act and prepare them to use the materials effectively. When they complete the first session they are ready to act, but they can't really know what to expect in the classroom.

When we meet again, after two months of using the program materials, they are able to ask meaningful questions. At this time we reinforce the positive aspects of their efforts and eliminate their problems, if possible. The time interval has proven to be extremely important and effective in our pilot year from both a teacher and administrative viewpoint. The pilot teachers seem to derive a good deal of encouragement in knowing that others are also succeeding and failing to a similar degree.

TEACHER PREPARATION

One of the most common problems experienced by change agents is the preparation necessary before using materials. Any teaching packet that requires extra work by the teacher can expect little use. For this reason we decided upon an 8½ x 11 format with large type, lengthy procedural guidelines, complete material lists, and ditto masters. We attempted to package all materials so that all the teacher has to do is run dittoes, collect materials, and guide the students through the exercise.

The most difficult aspect of this program is the discussion session during and after the exercise. Some teachers have a difficult time conducting an open session which encourages student involvement. We don't have an answer to this only suggestions and materials which encourage involvement. Out pilot year has shown us that sometimes the material will work inspite of teacher fears.

REASONABLE COST

Our program is structured so that it can be implemented at a cost of $15-$35.00 per teacher. Dependent upon class size, this ranges from $.15 to $.95 per student for all materials. The in-service program, if conducted without the use of institute days, adds $40.00 to the cost per teacher which costs $.50-$1.00 more per student.

Barring major printing increases or program revisions this should be the approximate cost for the next five years.

CONTINUITY AND SUPPORT

In our area of Illinois, school districts tend to be very conservative and closed to risk taking.

To ensure continuity and support we have attempted to satisfy the needs of administrators and board members.

We have carefully defined strategies for handling those areas of the program which are likely to cause problems, e.g. problem solving in the community.

We also make a point of working with any and all public groups and agencies which have any relationship to our program.

We use public relations techniques and every available medium to legitimize our program to the community, including a citizens advisory committee.

EVIDENCE OF SUCCESS

Statistical proof of success is perhaps our area of greatest concern. We have locally developed grade level tests which have content validity and reliability is being established but until we have all our post test data tabulated we will not know how successful we have been. Until we get some hard data this is an area of serious concern for us.

CONCLUSION

We are only 19 months into our program. Even though we have learned from many other programs, we still feel there is much to be done. We are in the process of incorporating more than 2000 teacher evaluations from our 180 pilot teachers. We will use their written and oral input to develop our semi-final product which we hope will undergo validation and the dissemination review panel.

ENVIRONMENTAL VALUE CHANGE VIA CREATION OF ENVIRONMENTAL SCHOOL YARD ECOSYSTEMS

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The resurrection of public environmental waste places in the urbanscape--asphalted school ground real estate, has been occurring with creeping advances, stretching toward a crescendo-like rise. Members of multiple interest groups representing a mix of interdisciplinary persuasions have spearheaded many of these projects in school-communities. Landscape architects/designers, anthropologists, urban planners, park-recreationists, environmental educators and communities have participated in reconstituting ascetic, bio-entropic, mono-cultural school yards which resemble penal compounds holding "people-hood" in confinement.

Efforts to diversify and humanize these environments have ranged from small scale, ephemeral band-aid type activities to ambitious, long sustaining complex projects, from basic physical embellishment with superimposed play structures and alternative equipment that are divorced from genuine environmental education conceptual/valuational frameworks to projects that are comphrehensively EE based entailing an evolutionary, interdisciplinary process without finitude.

School Yards as Ecosystems

The essential properties of ecological systems can be reflected in environmental school yards. Among many others, the work on ecosystematic property by Margalef (1968), Wilson (1973) and Fuller (1970) and particularly the "concept of holocoenotic environmental network" of Billings (1966) suspends concentration on any single factor because of the complexity of holocoenotic interactions between environmental factors in a school yard and the organisms (children per se). Therefore, a school yard as a micro-ecosystem is characterized by its parts and by the interaction among these parts.

Secondly, an historical property reflecting past and current happenings characterize ecosystems. A detailed example of this historical quality via succession plots in school yards with removed asphalt and the successional stages toward a stable climax ecosystem is described by Wong (1975).

The spatial property is a third one. Environments, of course, change through time and space in a tightly intertwined process. Environmental school yards as nonlinear cumulative, heterogeneous commodities make up a mosaic of time/space/people/objects with apparent infinite spatial and temporal interactions.

A catch-all structural property encompasses processes such as limits, thresholds and lags; all of these synthesize and interrelate the spectrum of ecosystematic components.

Urban systems interface natural systems and these systems all share the four properties--systems, historical, spatial and structural. "The equation of these characteristics produces resilience and stability. Since stability is delimited by

upper and lower borders, we must consider the perspective of Holling and Goldberg (1971), who point out that this boundary-oriented view of stability from ecology serves as a conceptual framework for human intervention into ecosystems. It deflects our efforts from increasing efficiency to increasing resilience. It emphasizes an examination of causes instead of symptoms. The transfer to environmental education is direct and zeroes in on the general character of urban school yards as ecosystems" (Wong, 1975).

Evocative Model for Changing Values

Project WEY--Washington Environmental Yard (1972) is a manifestation of the intercommunal, process-oriented, interage, interdisciplinary type of change vehicle toward an environmental ethic from the school-village level to a panperspective. The urban focus of the project as the medium has been inestimably vital since it is generally speaking the message. Situated near the central downtown area of the city of Berkeley and a mere block from civic center, Washington Elementary School courts the thousands of daily onlookers/passersby (20,000 autos!) traveling on a busy boulevard with easy access to the physical transformation and social interactions (at a distance to close-up)--a virtual open space laboratory. It has served evocatively as a catalyst for values confrontation, even through a soft mode of visual/physical data exchange system. Since 1971, the dramatic changes have represented a process tool for the development of environmental/educational value encounters on-site/off-site, indoors/outdoors and numerous other bipolar entities and dyads. The clients represent a mirror of the macro-world just as the children and parents of the school reflect more than thirty different ethnic groups--as one of numerous dimensions of diversity.

A critical objective of environmental education is more relevant resonance in the concepts of environment and its orientation to the future, communicating across barriers of race and socio-economic classes so that environmental problems are perceived and value-ranked as people problems as well as natural resource problems per se. Project WEY is designed to promote a mutualistic epistemology, a non-stationary culture, and a consciousness of the environment as a unified whole, as well as of specific local environmental problems within the context of ecological, economic and social values. Converting a 2½ acre portion of lifeless, oppressive black topped playground into a diverse, manipulable, heuristics-loaded resource area endowed with ponds/stream aquatic system, redwood grove, chaparral, meadow, rocky outcrops, marsh, vegetable gardens and facilities for barnyard animals, etc., has provided a dynamically fertile, resilient stage for soft/hard school/community EE interactions.

A vernacularly different curriculum has been an emergent concomitant to the unfoldment of physical and natural changes. A transition is occurring-actually a meta-transition as cultural futurologist Murayama (1970) refers to a meta-transition as a transitory era between what he calls "a chain of stationary or quasi-stationary patterns, which the population has accepted as given, to a duration of perpetually transforming patterns which depend on people's will and choice." A meta-transition is, therefore, a transition between types of transitions--a virtual change of the mode of change.

The general "classroom culture" and "school system culture" are in the majority programmed with prescribed perceptions, attitudes and values which characterize a quasi-stationary culture or at best, a metaphorical industrial model. A topian educational system of values and its existing isomorphic, formulated

goals and means can be traumatically challenged by EE and its evolving, diverse-goal system as EE functions as a catalytical non-discipline to prepare and facilitate people to move through a meta-transition into the phase of non-stationary culture and knowledge.

The point here is that the inculcation of high impact EE programs with a new epistemology in a school or in a school system involves value change amplification. People need to reject and unlearn a stockpile of pre-packaged, limiting objectives, goals and stationary approaches; they must re-order priorities and shift their values. Value changes must occur in administration, curriculum, pre-service/in-service education, nature of learning environments, and a host of other issues and behaviors. In essence, a network of anthropological interactions marks the process of EE moving into the status quo--a kind of cultural intrusion into school site and school system "universals".

Precipitating Value Change

A "soft" departure from the standard school yard might be illustrated by the introduction of simple, well constructed, perhaps institutionalized play structures; by the establishment of a school recycling center or by the start of a mini-garden. Little fur or static would rise from the administrative powers. But to blatantly reject the given outdoor school environment and mount a major campaign to remove massive hunks of asphalt and in the wake of the unauthorized process leave countless pieces of rock, dirt and clods is, however, a very different proposition. Add to this large scale, open system of changes, a flow of semi-fixed and loose elements (crates, cardboard, spools, cement blocks, branches, stumps, logs, sandpiles, etc.), and you have a clash of values. At Project WEY, to all of these kinds of manipulatives and natural/man-built material, downpours of rain created "environmental learning puddles and mud-sinks" plus an assortment of fortuitous creations in the terrain. Hundreds of children were naturally attracted to this rich, ever-changing autonomous new space. They explored, experimented, constructed/destructed things, made decisions, created fantasies and summarily seeked new concepts and values with open reign. When it became more apparent what this seemingly shapeless web of events and the unconventional changes might mean to the stationary culture of the school and the school system, the message was driven home that the EE project was not just a temporary grafting operation.

This realization reached layers of different target audiences and a breakout of valuative options prolifereated the lives and value stances of these groups... the bureaucratic environment of school system administration and off-site departments and the municipal entities, the residents of the neighborhood, the staff of the school, the parents and the children. Moreover, people in other school communities and members of the extended community-at-large have been affected.

Some of the value laden areas subjected to change include: nature of instructional materials requisitioned and utilized, curriculum configurations, insurance and liability, health and safety measures and "standard", schedule of the day at school, the after-school recreation program, week-end use of the 24-hour facility, budgetary needs, evaluation modes, relationship of basic education skills and accountabilities, public health/fire/public works/police department policies, roles of the maintenance and custodial staff, traffic flow of children and adults outdoors, resource/"junk" ethic, expansion of learning sites, increased need for trust and independence of kids, play as learning

process, eating outdoors, clothing requirements for outdoors, approaches to supervision, overnight camping on yard, vandalism, community yard fests, etc.

Discipline of Responsible Consent

Numerous dissonances were created early on with the kinds of areas listed above. These areas had and have a heavy impact on the lifestyle and aura of the school; our experience shows these entities evoked value dilemmas which deliberately set off potential preferences and a slowly evolving set of corresponding actions generally in support of environmental education, particularly as time reveals how truly positive and holistically responsible the project and its EE ethic conveys to our co-existence.

Brandwein (1969) has suggested there is a discipline of responsible consent. Its aim "is to interpose evidence, reason, judgement and compassion between desire and action." Its structure consists of the concepts and values deriving from human interaction and the repertoire of its body of content comes from the interaction of citizens in their quest for an effective society, one that resolves conflict.

What are the roots of the discipline of responsible consent? They embrace the concepts that guide our search for understanding and the values that guide our actions. Concepts and values are both taught and sought. To seek concepts and values is to grow, and to value growth. So, we are really required to explore the legacy of values and the ways of value seeking.

A resolution to the bulk of arguments dealing with values may be accomplished by resorting to evidence, reason and judgment by submitting them to methods of intelligence which uses concepts as tools, and these are concepts which are tied to the values we hold.

Brandwein has devised a conceptual scheme approach to the social sciences which incorporate six levels of behavioral themes of responsibility based on value seeking and five cognitive schemes based on concept seeking, making up the other co-ordinate of the curriculum matrix. The values that condition our behavior are evident as the six behavioral patterns are sequenced through the cognitive levels.

In the early level, the child deals with the value rules of class, family and peer group. One a more complex level, the child begins to understand the need for choice and that values are basic to choice. As the child begins to interpret his natural/man-built environment, his biophysical and social environment, he begins to recognize a broad range of alternatives for solutions as per what Raths, Harmin and Simon (1966) have labeled the "values continuum". An intrinsic part of valuing is choice, but choice is sterile without action.

This ties in to their Values Clarification Approach which is a three stage process--choosing, prizing and acting. Values are revealed via value indicators--goals, feelings, attitudes, beliefs, activities and worries. Seven criteria must be fulfilled to qualify for the presence of a value.

Behavioral, Procedural and Substantive Values

Michael Scriven(1966) cites values that he terms the "prudence level". These are the very values--"behavioral values" referred to by Fenton (1966) who differentiates three types of values: behavioral, procedural and substantive. The compliance with rules and regulations made by bodies of authority, the clean up of litter on the school yard or the restraining from swimming in an ecological study pond are examples of behavioral values.

Procedural values embrace evidence, reason and judgment--the interposition between impulse and action. Brandwein insists that the methods of intelligence be used to determine the validity of data. Fenton sums it up effectively: "critical thinking is better than uncritical thinking." He asserts that teachers have a right to reach both behavioral and procedural values but not substantive values although where appropriate, they may teach about them by raising issues for children to examine in terms of critical thinking. As he matures, the child begins to assess the value of "equal access to opportunity." So as the child grows in responsible conduct within an environmental ethic, he will show the values he holds in the actions he defends.

There are correlations of these schema to the moral growth model organized by Lawrence Kohlberg (1968) wherein moral growth occurs as a person progresses through his six stage typology: moral dilemmas or issues serve as excellent catalysts for reasoning and value ranking. I equate these dilemmas with the environmental encounters approach advocated by Stapp (1973). Project WEY breeds these dilemmas with ease as the process of bringing about a new open space learning resource is crammed with moral value nuclei.

Convergent Values as a Tool

Goals vary from individual to individual, and some of them will converge. Mentioned earlier, relevance resonance is the convergence of goals. Usually there is someone in the higher levels of a hierarchy which has goals convergent with yours or with someone at the school site who can push the buttons. Hopefully this someone is the site administrator. The object is to identify the connection, to clarify the multitude of values and issues in a joint enterprise. Project WEY fortunately identified an advocate close to the convergent model, and through this member of the school district power circle, we have been able to defuse some tensions and reduce obstructive tactics. EE objectives were internalized by our connection who valued--selected, prized and acted upon repeatedly as a unified approach following Raths, et al's process.

As a result, efforts and "change-phobia" which would have stifled progress by municipal and school district bureaucratic cords were severed via this mutual causal network. This responsible consent helped to amplify change in the physical, social, psychological and instructional environments--fundamental constructs of Project WEY. This deviation-counteracting, mutual system has persisted for the five-year lifespan of the project and now there is definite tolerance if not outright positivism draping the project. Naturally, this equilibrium produced by change amplifying interaction must permeate the EE program on the site itself; the component groups of teaching and support staffs must be part of the flow.

The Silent Valuing Process

The time table of modifying school yards toward environmental yards toward environmental yards deals with the relationship of the readiness of the prime value formers on the school site--the professional staff. Significant persons as value formers (Hall, 1973) exert influences via their attitudes and the environments they create. But the process is in reality ploddingly slow--patience and perseverance are bywords.

As administrator of the school and administrative/conceptual "co-conspirator" of the project, I was generally able to perceive, cultivate and nourish certain levels of valuing a complex of vital elements dealing with change, topophilia, environment, curriculum, children and of course administrative implementation vis a vis the inertia and momentum of the staff and community. Likewise, clues and outsight were organized to permit low risk-taking and deployment of key people to engage in intensive EE perspectives. Opening the indoor classroom environment is just a first step since there are given constraints indoors. Moving from one's indoor domain to the much less defined wide open outdoors, an environment which begs common stewardship, can be a very discomforting orientation. The administrator and his project co-workers share this experience with an enormous learning resource and must try to help users to gauge their "consumption" of this yard micro-ecosystem with small "digestible" increments.

Existential Value Formers

The powerful relationship of people and environment is based on a qualitative aspect (Pirsig 1974). This relationship is important to capture, recognize and utilize as existential value formers in a childhood culture. Hall asserts "existential value formers confront a person with his total human reality in the face of the world. They prompt a man to question the meaning of his nature as a human being among other human beings in the world. The issues of death and limitation and creativity and the totality of life are involved in the area of existential value formers".

He goes on to cite examples of value formers--freedom, trust and imagination which are highly regarded by the environment. Autonomy is another value former. The kind of environment allowing autonomy would be, in particular, the one of freedom. That is, autonomy is the experience of a child to be able to make choices which are his own and to experience positive consequences as a result. The freedom initially profferred and responsibility finally obtained are examples of chosen values that can result from this original value formation.

Imagination is obviously a natural aspect of any human being. The positive attitude towards fantasy in the child can affect the original and existential value formers experienced by the child, and, therefore, his chosen values. As imagination and ideas are developed, creative alternatives increase. So ideas, creativity and meanings are additional value formers.

Implications for Environmental Yard Ecosystems

Significant persons, their attitudes and the environment they create are influential as original value formers. Parents, siblings and teachers are such

significant persons. Parents and teachers representing community and school are crucial agents in establishing environments to support autonomy and imagination as part of the ecology of imagination of childhood. It is essential to give children (and adults) opportunities to interact with differentiated and changing environments effecting symbiotic adaption and continuous growth. Cobb's (1966) pervasive essay on the ecology of imagination in childhood provides a cogent substratum for further development of the key position of place as quality. Whether by chance or by design, all forms of instruction begin by appealing to the learner's imagination. Despite everything, children are likely to encounter novelties in school which challenge their sphere of mastery, and therefore incite their imagination usually on some regular schedule.

Child Environment/Natural Environment Proxemics

Empirical evidence connected with Project WEY and other studies of children's behavior, Moore (1975) and Young (1975) emphasize that children adopt and take over natural environments as child environments. Data from children's reactions and activity patterns,preferences and values show certain media as prized environmental proxemics or those elements that have a human association. They include a basis to design and make available such media that are characterized as fixed, semi-fixed and loose components...biotic, abiotic and cultural. In a school yard ecosystem, these media should include at least these categories: plant life, soil, sand, rocks and duff; water, from little puddles to ponds; topographical diversity.

These environmental imperatives are responses to the open system of child/environment proxemic effects. The range of options rests on the complexity of the environment. Complexity should be multi-dimensional and polymorphic with many adaptive transacting themes and variations. Unorganized non-linear complexities are autonomous opportunities for children to use as open space for creative play and learning. The open system encourages individualistic and unprescribed interplay between people, between people and environment, and between the learning environments indoors and outdoors. This results in a continuous state of disquilibrium that is identified as a steady state. It is characterized by continual reorganization of the curriculum and reconstruction of the environment as needs are assessed (Wickens, 1973).

Closing

Perceptions, attitudes and values of the generation and management of an outdoor/indoor environmental school yard ecosystem will continue to be a center of encounter. Our experience tells us that it is indeed a process which evokes concept and value shifts toward environmental education. As a cornucopia for EE, it has been and continues to be a viable compass for embodying EE as lifekind.

"Man is an organism who lives not only in
but through our environment"

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GENERAL TOPIC: ENVIRONMENTAL EDUCATION

92/93

FACILITATING CAREER LINKAGES BETWEEN THE ENVIRONMENTAL SCIENCE GRADUATE AND THE WORLD OF WORK

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I. INTRODUCTION

In recent years career preparation of undergraduate students has received increasing priority in the mission of higher education. Yet, colleges and universities seldom analyze carefully employment prospects of graduates in developing new programs and revising existing curricula. Most academicians assume minimal responsibility for the career planning and placement aspects of their students' four years on campus. From the viewpoint of the well-being of students and society, however, few functions could be more important.

This paper is based on the assumption that career planning assistance is a fundamental responsibility of all faculty and administrators who advise students. Moreover, it is a basic element of the educational continuum which begins when a student enters college and ends with successful career placement following graduation.

Career planning and placement occurs through two prime linkages: (1) close cooperation between academic departments or programs and offices of career planning and placement in the process of career selection, identification of career opportunities and preparation for the employment search; and (2) systematic development of placement relationships with specific employers in the world of work.

Methodologically, career planning and placement should be a scientific undertaking with both philosophy and goals, systematic methods of research and analysis, a growing body of scholarly literature, and behavioral outcomes which can be precisely measured. In essence it is a sequential process through which the student determines personal and career goals, assesses available career opportunities, develops an academic program designed to realize personal/career goals and employment opportunities, prepares for the employment search, and executes the employment search.

This paper seeks to adapt the process of career planning and placement to the emerging undergraduate discipline of Environmental Science. As such it has three related parts:

1. Outline of a programmed approach to career planning and placement;

2. Description of career planning and placement activities in Environmental Science at SUNY-Plattsburgh; and

3. Results of an Environmental Science career employment opportunities survey.

II. A PROGRAMMED APPROACH TO CAREER PLANNING AND PLACEMENT*

A programmed approach to career planning and placement involves a systematic process through which the undergraduate student integrates his total college experience to identify and achieve personal and career goals. This process consists of four distinct stages which correspond to the undergraduate's advancement toward graduation (A diagram at the end of this section of the paper also provides a step-by-step explanation of the programmed approach):

1. Identification of Compatible Traits (Freshman-Sophomore level)

   a. Self actualization--recognition of personal values, interests, abilities, and skills.

   b. Awareness of world of work--investigation of expectations, conditions, and responsibilities of career employment.

   c. Investigation of existing range of careers--beginning of career selection through examination of career information literature, newspaper advertisements, professional journals.

2. Reality Testing (Sophomore-Junior years)

   "Interview yourself and employer"--actual contact with potential employers to gain firsthand knowledge of company or agency operations and conditions, and to begin to develop a file of personal contacts; use of summer jobs to gain work experience; letter writing to gain information; student memberships in professional associations, etc.

3. Integration of Academic Program and Career Planning (Junior year)

   During this crucial year a synthesis should occur involving determination of personal values and preferences, career selection and planning, and finalization of academic major(s) and supporting skills/subject matter area concentrations.

   Several important decisions might be made in the junior year:

   a. Confirmation of objectives and specific academic/career program.

   b. Resolution of the role of parental influence in career selection.

   c. Development of second major and/or additional area concentrations to support major.

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*In describing the programmed approach to career planning and placement, the authors are indebted to Russell Hamilton, Director of the Office of Career Planning and Placement at SUNY-Plattsburgh, who has instituted this approach as a regular service of the Office. Recent literature on the subject includes Figler, Bolles, and Crystal and Bolles (see Bibliography).

d. Change of majors.

e. Transfer to another college for program or other reasons.

f. Leave college temporarily or permanently.

g. Choice between graduate school or career employment.

4. Career Placement (Senior year)

The central career activity in the senior year is the development of a systematic approach to job hunting. This process should include a reaffirmation of earlier personal and career decisions about employment or graduate school, and a review of career opportunities, personal contacts, and personal/career alternatives. This review could result in the reversal of a previous decision to go to graduate school or to pursue career employment in favor of the other. Indeed, the career placement procedure can be adapted easily for graduate school selection/acceptance purposes.

The career placement process consists of the following major steps:

a. Articulation of clear job objective.

b. Consideration of senior career internship or practicum to gain work experience.

c. Development of placement file (Career planning and placement office may have training workshops, seminars, and counseling).

1) Composition of Resume (purpose of a resume is to obtain an interview). Choose appropriate one of three types of basic resume:
- chronological (traditional)
- topical
- functional (emerging type)

2) Letters of reference
- should emphasize student strengths
- obtain from persons favorably inclined to student
- resolve question of confidentiality

3) Academic records (transcripts, etc.)

d. Contacts with Potential Employers

1) Careful selection of limited number of potential employers where opportunities are favorable

2) Appropriate letters of application

3) Follow-up on personal contacts established during college years.

e. Interview (Career planning and placement office may offer interview training)

III. FACILITATING EMPLOYMENT FOR ENVIRONMENTAL SCIENCE UNDERGRADUATES AT SUNY-PLATTSBURGH

The Institute for Man and Environment, located at the State University of New York at Plattsburgh and Miner Center, Chazy, New York, has offered a B. A. degree in Environmental Science since September, 1974. In these two years our program has grown to a current total of 275 full-time majors, with approximately 50 of these students being double majors (i.e., completing degree requirements in Biology, Geography, Chemistry, Physics, Education, or Economics, etc., in addition to Environmental Science). Our efforts to both develop a coherent Environmental Science curriculum and to integrate it with other degree programs on campus are reflected in our requirements for the major and our listing of course concentrations supporting Environmental Science (see Appendix).

We know full well, of course, that the proof of this new pudding called Environmental Science will be its track record in (a) producing B. A. graduates who can enter quality graduate programs in areas related to Environmental Science and in (b) facilitating employment possibilities for graduates who seek entry-level professional positions.

To use the terminology of the National Institute of Education's recent study, Bridging the Gap: A Study of Education-to-Work Linkages, we have found that the "education-to-education linkages" between Environmental Science undergraduates and graduate schools are in place and functioning quite efficiently. On the other hand, the "education-to-work linkages" are both weak and inefficient. This portion of the paper, therefore, will address the latter area.

We have conceptualized the process of facilitating employment possibilities for our graduates in three primary categories: providing career selection information, providing career opportunity information, and insuring student preparation for the employment search process. In implementing the senior employment search process especially, we have cooperated closely with the SUNY-Plattsburgh Office of Career Planning and Placement.

A. Career Information

We conceive our responsibilities in this area to be providing current information about careers: what do practitioners do, who employs them, and what procedures are necessary to accomplish to become eligible for employment in a chosen career field. Thus, we have developed a sizable library of career literature, chiefly materials published by employers which are helpful to the student in choosing a course to pursue.

An important section of the library is a selection of published reference works which indicate potential employers and their addresses. These include the Annual Conservation Directory, College Placement Annual, Federal Career Directory, World Environmental Directory, Environmental U.S.A., Careers in the Outdoors, Opportunities in Environmental Careers, Career Education in the Environment, and World Directory of Environmental Research Centers*. These reference works are of prime importance in locating sources for potential employment; however, as reported below, there is a significant rate of obsolescence in the published information, especially mailing addresses.

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* The full citations of these works are provided in the Bibliography.

In maintaining our career information library, we have employed federal work-study students under the supervision of the junior author. We have recognized as well the contributions to be made by having students engaged in the employment search share with us the replies they receive from potential employers, which we then duplicate and add to the library.

Finally, we have attempted to develop from among these resources career information particularized to our program. That is, we have selected a sample of 275 potential governmental agencies and private firms to which we have sent materials descriptive of our curriculum together with sample resumes of our graduates and asked them to respond to a questionnaire concerning potential employment with their agency or firm. The results of this preliminary survey are presented and discussed in Part IV. We mention this project here to indicate that in conceptual terms, such a survey contributes almost exclusively to career selection information rather than to career opportunity information. This contrast will be discussed in the following section.

B. Career Opportunities

Our experience over this two-year period of our degree program has been that building a career information library primarily serves the purpose of assisting students to select a career field; the further purpose of attempting to locate an open employment opportunity is very inefficiently served by providing directories of potential employers. The critical question, of course, is which of these thousands of potential employers have openings in the near time-frame of our graduates' availability.

Recognition of this discrepancy between career information and career opportunities directed us toward organizing means to locate and disseminate career opportunities information on our campus. We are pursuing this task by employing two work-study students to search weekly through the New York Times, Washington Post, Boston Herald, and other newspaper classified advertisements, and through periodicals such as Environmental Science and Technology, Bioscience, and Ecology Placement Service.

An additional source of career advertisements is the professional association newsletter, and we are currently reviewing as many of these as we can locate to identify an optimum number for our subscription budget.

As advertised positions are located, they are brought to the departmental secretary who types them for posting at the Environmental Science Office, with copies being sent to the Career Planning and Placement Office and the College Student Center. In addition, a copy to the Instructional Resources unit is run on campus-wide closed-circuit television which hopefully reaches a fair proportion of the Environmental Science students (as well as being visible to the university administration!).

These may seem like rather pedestrian arrangements, but we believe they represent important initiatives toward making the provision of career opportunities information a routine departmental function. An important spin-off of our initiative in this area has been to stimulate student motivation to begin the employment search process early, preferably in the freshman or sophomore year. Our efforts along these lines are only in the beginning stages, as will be seen next.

C. Student Preparation

The third component of our efforts to facilitate employment opportunities for our graduates may be summarized under the rubric of attention to the students themselves. That is, given our provision of career selection information and our continuous flow of career opportunities information, what further efforts can we reasonably make to increase the motivation and responsiveness of the students--mostly seniors--to the demands of the employment search process?

In the very broadest sense, of course, the foundation of a successful employment search process is laid in the quality of the education we provide in courses, research experience, and field work. Beginning then with the more advanced aspects of our educational sequence, we provide seniors with the option of a semester's internship off-campus with governmental agencies such as the U. S. Soil Conservation Service, U. S. Public Health Service, New York State Department of Environmental Conservation, N. Y. S. Adirondack Park Agency, or Plattsburgh City Engineer's Office; or with private industry such as H. P. Associates of Schenectady and planning consultants. We are hopeful in the near future to be able to place interns with major corporations such as New York State Electric and Gas Corporation, Georgia-Pacific Paper Co., or Alcoa Aluminum. As a form of cooperative education, we find that such internships fulfill (at least) the three functions of providing the interns with entry-level professional experience, providing them with experience to be highlighted on their resumes, and in a small percentage of the cases, with continuing employment at the agency or firm following their internships.

In the alternate semester to the internship, we require of seniors that they enroll in the Seminar in Environmental Policy and Management course. While this course is conceived primarily as an integrative capstone to the Environmental Science major's chosen course sequence, it also includes employment search procedures and it is through these that we focus major effort in encouraging student preparation.

One component of the mid-term examination in the Seminar is the submission of a "final" resume; by final we mean one that has been reviewed with the junior author and with the Career Planning and Placement Office (we would like here to say "approved" as well as reviewed, but the student's final right to retain what we might consider to be deficiencies in his or her resume must be respected; the limits of our authority would seem to be reached with the submission of a "reviewed" resume).

Another component of the mid-term is that we follow up on certain course requirements announced during the introductory session of the class; namely, we check whether each student has registered with the Career Planning and Placement Office (CPPO) and has attended one of the CPPO Resume Workshops and one Interview Training Workshop. The Resume Workshops especially are a joint effort of the Environmental Science program and the CPPO; in this way the particular skills inherent in the Environmental Science program are emphasized in the functional resume.

Additionally, we require the student to indicate on the checklist whether, and if so when, he or she has registered to take the Federal and New York State Civil Service examinations; or alternatively, to state that he or she chooses not to do so. Our experience has been that often the student fails to begin the Civil Service employment process because it appears too complex; our efforts together with the CPPO are to facilitate the student's selection of the proper grade and examination and to assist in completing the extensive application forms, which can be obtained at governmental employment offices or by writing the U. S. Civil Service Commission in Washington, D. C.

D. Summary

Taken together, our efforts to provide career selection information, present career opportunity information, and encourage student preparation for the employment search process establish an atmosphere of serious attention to the mechanisms needed for facilitating employment for Environmental Science graduates.

Students visiting Plattsburgh State to "check out" the Environmental Science program, students already attending Plattsburgh State and considering becoming an Environmental Science major, and students already Environmental Science majors proceeding to identify and develop their specialized skill areas all have access to information assisting them to select and become qualified for a chosen career field.

Students nearing graduation have access to a continuous flow of career opportunity information; those recently graduated and still seeking employment can maintain access relative to their efforts to continue contact with the departmental office.

Students will in the final analysis obtain their own employment. Our measure of success is whether we have educated them well as environmental scientists, prepared them wisely for the employment search process, and facilitated efficiently their hope-against-hope efforts in a time of scarce employment.

IV. RESULTS OF ENVIRONMENTAL SCIENCE CAREER EMPLOYMENT SURVEY

The career survey of 275 potential government agency and business firm employers of Environmental Science graduates wea initially distributed in November, 1975, with follow-up reminder letters sent out in March, 1976. Most agencies and firms who received questionnaires were selected by work-study students working with the authors from career information literature on the basis of their titles. The authors added a small number of addresses based on personal familiarity.

The statistical tabulation of questionnaire responses at the end of this section is self-explanatory for the most part, but does reveal several clear patterns in the views of the respondents.

Although fully 60 percent of the respondents indicated that they would consider employing Environmental Science graduates, a contrast in opportunity appears when the rate of governmental agency favorable responses (89.5%) is compared to business firm favorable responses (44.4%).

Virtually no respondents were willing to send a representative to campus to interview Environmental Science graduates. However, 15% of the respondents related this decision to the current state of the national economy, with the obvious possibility of a change of policy in the future.

The tabulations reveal that a fairly significant number of agencies and firms were willing to provide career employment information and to express opinions about the Environmental Science curriculum. This willingness to exchange views, however, emphatically stopped short of a commitment to establish a continuing dialogue with the Institute for Man and Environment regarding career employment (note that only two respondents replied favorably to this question).

Yet, although virtually all respondents refused to undertake continuing individual correspondence with the Institute, nearly one-third agreed to place us on their mailing lists and half who answered the question requested to be placed on our mailing list to receive materials related to career preparation of our Environmental Science graduates. This allows us to anticipate that successful placements may yet occur with these agencies and firms in cases where specific job opportunities can be responded to by well-qualified graduages. Our task of facilitation now is to remain visible enough with these agencies and firms that we will be notified of job opportunities as they occur.

Ten of the respondents included detailed letters expressing a variety of views regarding employment prospects of Environmental Science graduates. These letters, plus a number of comments other potential employers added to the questionnaire form itself, contain perhaps the most valuable insights and guidance derived from the survey.

Eleven of the respondents stated that our graduates should have a background in engineering; eight emphasized the necessity for a strong background in natural science, especially Biology. These comments reinforced our conviction that Environmental Science students should pursue a double major and reassured us that we are on the right track in developing a pre-engineering/applied physics double major option with the Physics Department.

In a similar vein seven respondents suggested that our curriculum leaned too heavily toward educating the generalist. We feel this view reflects perhaps more on the student's prerogative to choose to be a generalist than on any limitations of our curriculum.

Yet, the letters and comments hold out hope that undergraduates who plan their careers and curricula wisely can lay the foundation at the bachelor's level for managerial careers which may involve continuing graduate education at a later date.

In summary, inherent in the curriculum development and career planning process is a recognition that clear preparations must be made for careers in government and business, whether the potential employee is preparing for a federal or state civil service position, or as an environmental analyst in a business firm. Considered in isolation, our survey of potential employers of Environmental Science graduates has failed to uncover an abundant range of career opportunities. It has, however, begun the process of establishing specific linkages with employers in the world of work which we hope will expand to career opportunities as well as career information as our program develops.

TABULATION OF ENVIRONMENTAL SCIENCE CAREER EMPLOYMENT SURVEY*

Questions Asked	Total Respondents			Government Agency Respondents			Business Firm Respondents		
	Yes	No	% Yes	Yes	No	% Yes	Yes	No	%Yes
(1) Our organization would consider employing college graduates with majors in Environmental Science.	33	22	60.0	17	2	89.5	16	20	44.4
(2) We are interested in sending a representative to the SUNY-Plattsburgh campus to interview EnvSci graduates.	2	48	4.0	1	16	6.3	1	32	3.1
(3) We are enclosing information about career employment opportunities in EnvSci with our organization.	21	28	42.9	13	4	76.5	8	24	25.0
(4) We are enclosing our views about curriculum offerings which the Institute for Man and Environment might add or change to better prepare EnvSci graduates for employment in our organization.	17	31	35.4	8	8	50.0	9	23	28.1
(5) We are specifying areas in which we need more information about the EnvSci program to evaluate career employment opportunities in our organization.	2	43	4.4	0	17	0.0	2	26	7.7
(6) We wish to maintain contact about career employment with the Institute for Man and Environment and have placed the Institute on our mailing list to receive relevant information.	17	27	38.6	8	8	50.0	9	19	32.1
(7) We wish to be placed on the Institute for Man and Environment mailing list to receive materials related to career preparation of EnvSci graduates.	23	23	50.0	8	8	50.0	15	15	50.0
A. Questionnaires Mailed		275			60			215	
B. Undelivered Questionnaires		25			3			22	
C. Total Respondents		56			19			37	
D. % Returned of Delivered		22.4			33.3			19.2	

*Please note that some respondents did not answer all questions.

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THE ROLE OF VALUES IN ENVIRONMENTAL DECISION-MAKING AND IN ENVIRONMENTAL EDUCATION

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Communities are Making Decisions on Far-Reaching, Complex, Environmental Issues

I watch communities of vastly different sizes and make-up wrestle with difficult environmental decisions. For example:

1. The Shell Valley in Wyoming lies at the foot of the Big Horn Mountains and has what probably are some of Wyoming's most attractive farms and ranches in it. For a person who enjoys city life, Wyoming does not have much to offer; for one who values the rural experience, Wyoming -- and particularly places like Shell Valley -- has a lot to offer. Not surprisingly, therefore, many -- if not most -- people in Wyoming's small towns and cities would prefer to live entirely away from town, out on and between the farmers' fields, pastures, and herds.

   As this kind of development is beginning to happen the ranchers, farmers, and other inhabitants of the Valley are wondering what kinds of environmental criteria should be adopted to make sure that the subdivision of land for non-agricultural uses will not destroy the very features that make the Valley the wholesome and attractive place that it is. They are also asking themselves the agonizingly difficult question of what the rights -- and the obligations -- are of an individual landowner when his individual decision has social, cultural, economic, and environmental effects far beyond the time boundaries of his generation.

2. For a generation or more our society has -- for all intents and purposes -- lived by the motto that "Economic Growth Constitutes Progress". While most people are now prepared to question and debate the wisdom of this motto, some -- but very few -- communities are actually beginning to make decisions that are in contravention of this motto; they are consciously and explicitly making choices through which they hurt themselves economically -- but through which they enhance some other dimension of their "quality of life".

   New Hampshire with a depressed economy and high unemployment rebuffed Aristotle Onassis' proposal to build a deep-sea port and oil refinery -- which would have constituted a massive infusion of dollars, jobs, and business into New Hampshire's very depressed economy, but which also would have affected the area's ecology and the people's "way of life".

   The people of Colorado debated the wisdom of having gained, for their State, what must be the prize apple among regional Chambers of Commerce, the Winter Olympics. They actually changed their minds on it, and they elected a governor[1] <u>because</u> he had been instrumental in getting the Olympics <u>out</u> of Colorado.

[1] Governor Richard Lamm

The State of Oregon has gone so far as to adopt an express policy that newcomers to the State are not welcome.[2]

3. The people and the institutions of this entire country are beginning to address the value-laden trade-off decisions that are implicit in every major public action.

   The National Environmental Policy Act (NEPA) is just one step in that direction. Its intent[3] is to clarify for a given decision-maker, or set of decision-makers, what the options are that are available to him and what the long-range consequences of each of the options are. While it cannot compel a decision-maker to make a wise decision, it does make it more difficult to exercise an option that may have only short-term benefits but serious long-term disadvantages or costs; i.e., it becomes harder to make short-sighted decisions. This is a responsible way, in fact, the correct way for a "community" as large and diverse as our entire country to address these value-laden decisions.

I also anticipate that we will be addressing other major issues in a manner similar to that of NEPA; in fact, we could use NEPA as the vehicle for addressing them. Some of these issues are:

- the consequences of major policies or actions for U. S., and world, food production

- the consequences of major policies or actions for the survival of our socio-economic system, particularly for the survival of the "free enterprise" system and/or the concept of, and the right to, "private property".

In each of these examples we have a "community" made up of diverse interests, even conflicting interests, trying to make a collective decision involving environmental issues.[4] These are not the only environmental decisions that are being made -- and that need to be made -- but they are the most difficult environmental decisions that are being made. They are the most difficult

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[2] Only time, however, will tell whether the State and its government are able and willing to follow through with this and actually make newcomers unwelcome.

[3] Though this is the intent of the National Environmental Policy Act, it and the many different sets of guidelines that have been developed in connection with it, are complex enough that many, if not most, of the environmental planners and analysts manage to spend their time and money analyzing a proposed project's or policy's environmental impacts without clarifying in any way the real gut issues of the environmental trade-offs that are in the balance and that the decision-maker(s) need to consider.

[4] Obviously, I am using the term "environment" in the very broad and inclusive sense of man's environment. It, thus, includes not only the cology of flora and fauna but also man's ecology of institutions, culture, and economic systems.

environmental decisions for two reasons. First, there are, in the scientific sense, no "right" or "wrong" decision when it comes to making trade-offs between the values of competing or conflicting interests.[5] Second, more often than not, this kind of environmental decision-making involves the agony of a community first calling into question -- and eventually rejecting -- some basic assumptions or values that have governed much of that community's public actions. This involves the kind of soul-searching that is no easier and much noisier for a community to do than it is for an individual.

The communities who are facing some of these crucial, though difficult, value-laden decisions, be it a community as small as a few dozen households living in Shell Valley, Wyoming, or as large and diverse as the entire nation, generally do hire professional environmental analysts or planners to assist them with their decision-making process.

The thrust of this paper is two-fold.

1. The paper asks: What is the most constructive role for a professional assisting a community of diverse interests requiring collective decisions on far-reaching, complex environmental issues?[6]

2. We ask: What kind of a curriculum is needed to train planners or environmental experts to perform in this role successfully?

The Environmental Professional's Role in Decision-Making is Unique

Any model of community decision-making that is based on something more than wishful thinking has to assume that each of a community's constituent interests is trying to effect a community decision most favorable to him. In other words, each

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[5] There are, of course, in an objective sense, "correct" and "incorrect" predictions of impacts. But, when the impacts are predicted accurately, the choice, for example between jobs for the unemployed in an area versus retention of a rural character for an area -- generally, cannot be said to be "right" or "wrong" except from the subjective point of view of an affected interest.

[6] Note that I'm using the term "community" to focus on the fact that the most agonizing value-laden decisions are difficult because they have to be made jointly by groupings of, collections of, i.e., "communities" of -- different interests; interests with different likes and dislikes, with different priorities -- different values -- and, therefore, different preferences.

interest is trying to maximize his own utilities.[7] The more specific question we thus must ask is: When a community of diverse interests, each of which is trying to maximize his own individual utilities and has its own preference ordering for the alternative courses of action that are available to the community, has to make a collective choice from among several alternative courses of action, each of which has far-reaching complex, environmental ramifications, what role should the environmental professional play if he has been hired by that community to assist in developing and choosing a course of action?

It is necessary, at this point, to list some of the roles that such a professional either cannot, or should not, play.

1. Any "objective" or "scientific" method that one might try to use for the various interests individual preference orderings -- into a collective community preference ordering -- does violate some of the most basic and, in our society, most broadly shared values.[8]

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[7] This might be called an "individual (interest) utility maximizing model". It, of course, is not the only model of how individuals behave in community decision-making; in fact, it is not the popular model. Political science has, evidently, put more stock into models that assume that each individual interest -- when participating in a communal decision -- tries to maximize "the public good". These models also hold that, it just so happens that there is a lot of disagreement as to what constitutes "the public good". A second look at the model that is proposed here, i.e., the "individual (interest) utility maximizing model", suggests that, though different, it does not conflict with this second, i.e., "public interest maximizing model". If this second model is, in fact, a valid way to describe how an individual interest behaves when participating in a communal decision, then he, obviously, does, whatever he does, because he has the highest individual utility for doing it. Each individual interest, thus, is still maximizing his own utilities. This is not a trivial point. What it means is that, if we proceed on the assumption that each interest is maximizing his own utilities -- not only in his individual decision-making but also when he participates in a communal decision--we are not violating any assumption that we would have to make if we used a "public interest maximizing model". If, on the other hand, we proceed on the assumption that each individual interest participating in a communal decision maximize his particular view of, or vision of, the "public interest", then we may very well be in trouble if it turns out that one or more interest does not do so. The "individual (interest) utility maximizing model", thus, simply constitutes the adoption of a more cautious -- and safer -- set of assumptions.

[8] For the benefit of the uninitiated, this is not a willful assertion on the author's part. It is a statement of scientific fact. Kenneth Arrow in his Social Choice and Individual Values (New York: John Wiley & Sons, 1951) developed the scientific proof of this. His finding--to which he gave the misnomer of "General Possibility Theorem" when, in fact, it is more of an "impossibility theorem"--will, when finally understood by economists, planners, and other people dealing in public policy, change public decision theory as fundamentally as Einstein's "Theory of Relativity" changed physics. It took the world of scholars twenty years to realize the import of Arrow's work (he received the Nobel Prize for his General Possibility Theorem twenty years after he developed it), and--it appears--that it will take the world of practitioners in public decision-making another twenty years to discover his work.

Should the professional planner we are talking about here fail to understand this fundamental principle, and should he, thus, attempt to use some "objective" rule or algorithm, for aggregating individual preferences, he would be doomed to violate some of contemporary American Society's most basic values.

2. Schemes for evaluating alternatives and for selecting "the best" course of action, whose logic is not fully understood by the lay interests who constitute the community, cannot be used; the lay interests in contemporary American society--rightly or wrongly--refuse to abide by the output of "black boxes".

3. Pseudo-political schemes for selecting an alternative--for example, treating the various interests expressed preferences like votes without holding an actual referendum in the political arena--can, first of all, be readily manipulated to yield virtually any kind of outcome one wants[9] and second, are subject to Kenneth Arrow's devastating finding.[10]

4. Each or any one of the several different interests who are trying to make a collective decision can, of course, hire his own planner or environmental expert. Such an environmental expert, then, functions essentially as an advocate for that interest. Examples abound. I am not, here, trying to describe what his role is or should be.

   The environmental expert whose role we are describing here is the one who is hired by the entire collection of diverse interests, i.e., the community. His role must be distinct from that of the environmental expert who is an advocate for a sub-set of the community's constituent interests. Thus, we have to insist that the expert whose role we are describing here must not be an advocacy role for any sub-set of the community's constituent interests.[11]

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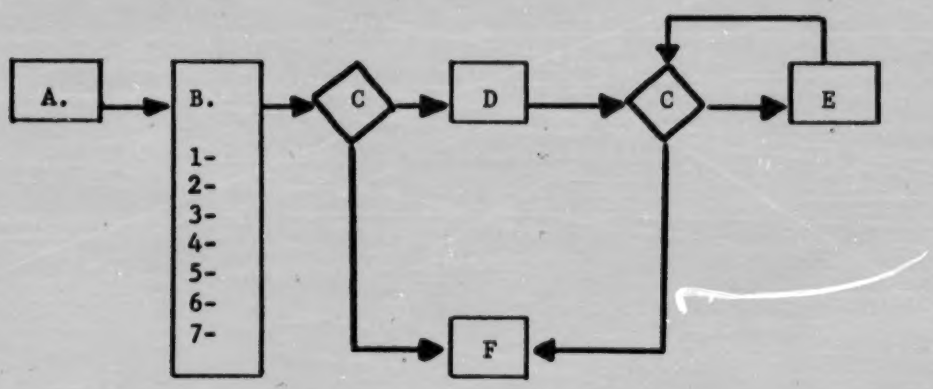
[9] See Buchanan & Tullock, The Calculus of Consent (Ann Arbor, Mich., Ann Arbor Paperbacks, 1965).

[10] Ibid.

[11] Note that this in no way suggests that you or I should not function as environmental experts advocating for a special interest. All we are saying is that, if you or I accept the job--or the role--of environmental expert in the service of a community of diverse interests, then we better not have a "hidden agenda" of actually advocating for some sub-set of that community's interests.

One problem-solving process that <u>does</u> allow a planner to assist a community of diverse interests address complex and far-reaching environmental issues, and that <u>does not</u> violate the taboos mentioned above, is the "Augmentation and Meta-Process" strategy. Because the nuts and bolts of that community-oriented problem-solving process is not the focus of this paper, an in-depth description of its workings would be out of place here. The following diagram of the process' several steps will have to serve for our purposes here.



<u>Steps in the "Augmentation and Meta-Process" Strategy</u>

A: establishing and maintaining legitimacy
B: problem-solving steps
1-goal setting
2-bounding the systems
3-analyzing the working of the system
4-generating alternatives
5-predicting impacts
6-evaluating alternatives
7-making a choice
C: is there "substantial, effective agreement: on a course of action?
D: augmentation
E: meta-process
F: implementation

Having, thus, proposed 1) that we best use a model that defines a "community" as consisting of diverse--even conflicting--interests, each of which is trying to maximize its own utilities, and 2) that such communities <u>do</u> seek professional help in making collective choices, we are obviously describing a role for the environmental professional that is quite different from the more typical advocacy role, or from any other professional role. A careful analysis of the "Augmentation and Meta-Process" suggests that a professional <u>cannot</u> serve in this role successfully unless he has the following three attributes:

1. <u>Responsiveness</u>

   He has to be <u>responsive to the value systems of each of the diverse interests who make up the community he serves</u>. "Responsive", here, is used in the sense of "capable of empathy for", "sensitive to" the various interests' subjective perspectives. The fact that each interest views and evaluates the alternative courses of action that the community is contemplating <u>from the entirely subjective perspective of his value</u> system, is the key reason behind identifying responsiveness as a crucial attribute for the professional in question.

2. Accountability

Community problem-solving, normally, does not take place in a decision-making vacuum. Virtually every society, and every community within that society, develops its own ground-rules for making collective decisions, particularly, how to go about the process of making social choices with complex, far-reaching consequences for different interests. Community decisions that involve making trade-offs between competing or conflicting values are the raison d'etre of politics. The professional, who is the subject of this discussion and the problem-solving process he uses must, therefore, be accountable to--in the sense of "responsible to"--the legitimate political entities of the community he works for. The professional planner who has this attribute does not view the community's political decision-making process as something that needs to be bypassed or subverted; rather, he recognizes that the really hard trade-off decisions will have to be translated into political decisions if they are to stick.

3. Effectiveness

This last attribute actually covers a collection of attributes, including:

a. competence in the specific substantive discipline(s) that happen to be relevant to the issue(s) at hand

b. ability to communicate with--including the ability to listen to--the various interests who are potentially affected

c. possessing the minimum management skills necessary to administer the problem-solving process

While the "Augmentation and Meta-Process" strategy is not the only problem-solving process that a professional in this role can use, it appears that the three attributes that are crucial to make the "Augmentation and Meta-Process" strategy work--Responsiveness, Accountability, and Effectiveness-are crucial attributes for any environmental professional in this role. The environmental expert who works as an advocacy planner for a single interest need only possess the "Effectiveness" attribute. The other two attributes are not important; the advocacy planner faces issues dealing with those two attributes only at the moment he and his client consider whether he should--and could--serve in the role of advocate for the interest in question. Questions of "responsiveness" and "accountability" are, thus, disposed of at the outset. And, they are, of course, much simpler questions because "Responsiveness" refers to one single value system--i.e., that of the client--and "Accountability" refers to the decision-making authority and responsibility of the same client--usually a simple hierarchy.

The Training of Environmental Professionals Has to Include Training About Values

The foregoing discussion is not designed to convince anyone that "Responsiveness, Accountability, and Effectiveness" are central attributes of the successful planner or environmental expert. That would require an in-depth explanation of the constraints of any problem-solving process that is being carried out for a client--i.e., a community of diverse interests--who does not have a single, internally consistent value system but, rather, a collection of diverse, competing, even conflicting individual value systems.[12] The discussion is, instead, designed to outline

[12] Each one of these individual value systems, however, can be expected to have a reasonable internal consistency.

for the reader what some of our conclusions are after carrying out an in-depth analysis of community decision-making, and--trusting the reader's conclusions would not be vastly different should he choose to carry out such an analysis--addressing ourselves to the question:

> --If "Responsiveness, Accountability, and Effectiveness" are key attributes that the training program for planners and other environmental professionals needs to instill in the trainees, what kind of a curriculum can accomplish this?

At the University of Wyoming we have not only asked this question; we have also answered it. The University is instituting a small graduate program in Community and Regional Planning with the express purpose of training professionals who will be capable of playing the difficult role of assisting a community of diverse interests make collective decisions with complex, far-reaching ramifications.

The program, and its whole thrust, is in good part a response to what we perceive to be the most serious weaknesses of planning and other environmental experts working in the rural and semi-rural communities of the Rocky Mountain region. Most training programs appear to concentrate on creating the "Effectiveness" attribute in their trainees--to the virtual exclusion of the other two key attributes: "Responsiveness" and "Accountability". It appears to us that the reason for this lies in the inherent difficulty of dealing with values.

"Effectiveness" lends itself readily as an educational goal; most of the standard environmental courses and planning courses contribute to creating one or more of the three sub-attributes[13] of "Effectiveness". Training people to be "Responsive" and "Accountable" (as we described these attributes earlier) involves teaching courses that come to grips with both personal values and cultural values. Every university offers courses that deal with one or more aspects of values, but, unfortunately, and we do not know why this is the case, virtually all of these courses are taught only to very advanced graduate students (usually Ph.D. candidates in Economics, Philosophy, or Political Science).

The reason frequently given for this is that the courses require the mastery of very advanced mathematics and/or formal logic. It turns out, however, that this reason does not stand up. It is true that virtually all of the texts, etc., in this field are written in such a way that one cannot gain much from them unless one can "read" advanced mathematics and/or formal logic, but they do not have to be written that way! The basic principles of the various theories that do come to grips with values, and with the various roles of values in our society, all can be taught successfully to the student with no more than a solid high school mathematics background.[14] The second problem with the value-oriented courses that are offered at most universities is that if a student could, and did, take all of the courses necessary to give him the solid foundation in the role of values, so he would know how to proceed and be "Responsive" and "Accountable", it would take him several years to cover the necessary subjects. This, of course, is not surprising. While the professional we have in mind needs to master the basics of a rather comprehensive set of theories that deal with values, he does not need to study them in the depth that the Ph.D. candidate does who is specializing in the particular discipline most

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[13] The three components of the "Effectiveness" attribute are: --competence in specific substantive disciplines, --ability to community effectively, --possessing minimum management skills.

directly related to the theory in question. The value-oriented basic theories that I make reference to here are:

--the concept of utility; development, quantification, manipulation, and application of utility functions

--decision theory; including such concepts as: taking account of uncertainty, aversion to risk, comparing alternative options with non-quantifiable outcomes, maximizing expected utility

--game theory; behavior in inter-dependent decision-making (of the conflict as well as of the cooperation type)

--social welfare theory; particularly the incredible implications for planners of Kenneth Arrow's Nobel Prize winning "General Possibility Theorem"

--political theory; more specifically, theory of contemporary American democracy

--basic principles of bargaining and consensus-seeking

At the risk of being repetitive, I want to reiterate that we are talking here only of the value-issues that are so crucial to the professional who is not an advocate and that are not built into the curricula through which the typical planner and/or environmental expert currently is being trained.

The value-issues for the advocacy professional are being dealt with in most schools. Most curricula include training mechanisms, if not entire courses, to sensitize--and thereby, essentially, change or sharpen people's values.

The professional who is "Responsive" and "Accountable" in his role as a problem-solver on behalf of a community of diverse interests, understands and can work with two basic sets of values:

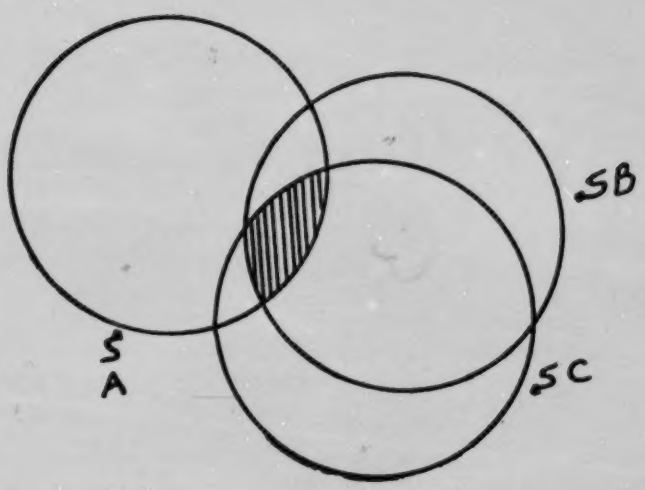
1. The various interests' individual value systems

   He knows how to go about understanding each interest's value system, and he respects the basic sovereignty of each individual value system. He, consequently, understands not only how each interest ranks the alternative courses of collective action that are under consideration, he also understands why each one ranks them the way he does. He, therefore, has a good chance of finding a consensus among all of the interests by coming up with additions to--or other changes in--one or more of the alternatives under consideration.

2. The community's "cultural values"

   In set theory terms, the community's cultural values are the intersection of all of the community's constituent interests' individual values. (Note: Figure 1)

Actually, a sub-set of the community's cultural values are of prime concern to our professional: those values that bear on that community's sense of "fairness", "equity", "due process", "compassion", etc., i.e., those values that bear on the criteria that the community uses in evaluating decisions, processes for making those decisions, and the rules that are used in choosing a decision-making process.



A: Interest A's Values
B: Interest B's Values
C: Interest C's Values

Community (A.B.C)'s "Cultural Values"

He knows how to get at the particular community's cultural values, and he understands that only those collective decisions and acts that do not violate the cultural values are implementable. When the community appears to have reached an impasse, he knows how to fashion--on the basis of the community's cultural values--a means for resolving the impasse.

We are, in the University of Wyoming's new graduate program in Community and Regional Planning, teaching a sequence of courses which will give each of our planning graduates a solid basis in value-issues that, we believe, are essential for a planner or environmental professional to have in order to play constructive non-advocacy roles. The following three courses are the key courses in this sequence:

1. Problem-Solving Processes

   This course teaches a student a systematic, basic problem-solving process that can be applied by an individual interest to virtually any type of problem. It also introduces him to--and teaches him how to use and/or deal with--the following concepts:

   --utility

   --uncertainty and statistical decision-theory

   --game theory and bargaining

2. Responsive and Responsible Decision-Making by Public Agencies

   This course teaches a student how to go about solving a problem when his

client is not one individual interest but a community that is made up of diverse interests, each with its own value system. It first teaches the student the meaning of Kenneth Arrow's work for him as a professional planner, and it examines the ethics of community decision-making--particularly, the ethics of choosing a collective course of action on which it is not possible to get a consensus.

The student, with the completion of this course, has the basic tools to work as a non-advocacy professional in the value-laden environment of assisting diverse, competing, and conflicting interests work out a course of collective action.

3. Seminar on the Planning Process

In this course the student applies his community problem-solving tools on case studies of community decision-making. This seminar course is aimed more at developing what might be called professional judgment in the use of his problem-solving tools than at developing additional tools.

A fourth course in this sequence, although it deals primarily with the management skills needed by such a professional, covers one further set of value issues. These are the ethics-issues that the student will have to face as a professional when he considers working for-or continuing to work for--particular clients.

In a parallel sequence of problem courses, in which the student is put in situations not unlike those he will face as a professional, he learns the need for a systematic problem-solving process, and he has the opportunity to apply the problem-solving tools he is learning in the theory sequence. The "Effectiveness" attribute is achieved by having a student propose and negotiate with the faculty his own curriculum in each of the following four areas of substantive disciplines:

1. Economic/Fiscal Systems
2. Social/Cultural Systems
3. Legal/Administrative/Political Systems
4. Physical/Environmental Systems

CONCLUSION

We find that the training programs for planning and environmental experts are adequate and can readily be accomplished by putting together a curriculum from among the multi-disciplinary and inter-disciplinary courses that are available on most campuses. A professional thus trained can be expected to have technical competence, and he can be expected to be quite effective in the role of an expert serving as an advocate for a single interest.

The most difficult and far-reaching--and probably the most important--decisions that our society faces, however, have to be arrived at not just by one interest or another. They have to be arrived at--and implemented--by the hodge-podge of diverse, competing, even conflicting interests that communities consist of. Our planning and environmental experts are wanted and needed by these "communities" to assist them in developing and choosing a course of action. This entire "community" decision-making environment is a value-laden environment, and most of our training programs do not prepare people to deal with the value-issues as well as

they prepare them to deal with the technical issues. Not only is it important to train planning and environmental experts to deal competently with value-issues, but fortunately, it is also possible to do so by pulling together the basic theories and principles from what usually are highly specialized and advanced courses, into a sequence of managable courses that can be handled by the typical advanced undergraduate or fresh graduate student.

Unless we provide the planning and environmental expert with the necessary foundation in value-issues, and with the tools to deal with value-issues, we should not be surprised if he simply throws up his hands every time he comes up against the fact that our society is made up of individuals, groups, institutions, organizations, corporations, etc.--i.e., different interests--each with his own value system.

VALUES-CLARIFICATION STRATEGIES AS A MEANS TO OPEN COMMUNICATION BETWEEN COLLEGE STUDENTS AND THE URBAN COMMUNITY

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Currently, there is little argument that the attitudinal-value realm is a consideration of the environmental educator. The question seems to be one of "how" rather than "if" one should work with values in the classroom.

Although there are numerous publications which include classroom strategies for working with values, few guidelines are available as to how to interrelate these techniques in a meaningful way with the specific objectives of an environmental program. It is relatively easy to present to students--from existing materials--the theory of value clarification, the impact a given set of values has had historically in the processes of making decisions, and the processes of participating in values clarification activities.

From this point on, the road becomes muddy. Assuming the students have dutifully participated in a values clarification activity, how does one relate this experience to the content and objectives of an environmental-education course? The nature of values activities can lead to extremely emotional and personal student statements creating situations that almost demand some sort of followup; yet only vague references are made to the role of the teacher/leader upon completion of most values-clarification strategies. How does the typical teacher, with a limited background in psychology, turn the theory of values clarification into practice?

The purpose of this statement is to describe a project that illustrates a use of values clarification in the classroom to accomplish specific goals of an environmental-education course.

The ideas presented are an outgrowth of a growing concern that existing environmental education programs seem limited in urban areas. Discussions with departmental colleagues, in-service naturalists, and public school environmental educators disclosed difficulties in working with city-bound residents. Reports from metropolitan park naturalists stated that, although a great number of park users were urbanites, the city dwellers (and in particular, blacks) were participating only on a limited basis in established park programs. They preferred to use the shelter houses and recreational facilities rather than nature trails and centers. Teachers were also reporting difficulties in motivating urban school administrators, parents, and students to include environmental education in the curriculum.

In an effort to respond to these situations, faculty within Ohio State's School of Natural Resources began reviewing the environmental education program and sharing observations to try to identify ways in which we might better understand and assist in solving the problem. We compiled the following information we felt might somehow be related:

(1) Current Natural Resource student enrollment data at Ohio State disclosed that the vast majority of students were from rural and suburban communities. (University Enrollment Data, Robert Henne, SNR School Secretary.)

(2) Ohio State's School of Natural Resources philosophy of environmental education includes urban concerns, but none of the course offerings specifically focused on urban environmental education.

(3) Although several departments on campus offer course work focusing on some aspect of urban concerns, few Natural Resource students were choosing to enroll in them. Those that did were not overly enthusiastic as to the applicability of these courses to environmental education.

(4) Initial survey data from a dissertation effort that assessed college students' attitudes toward environmental issues (Bowman, 1972) indicated that Natural Resource students' concepts of environment seemed to exclude urban areas; they thought of environment as being scenic, esthetic, or "nature" oriented.

(5) Individual conferences with current students revealed that they realized they might be working within the urban perimeter upon graduation and were uncertain how they could begin to relate to urban people and their concerns. Some even expressed fear.

Since I had served for the past year as an educational consultant to Head Start Programs in Region V of the Office of Child Development, I was able to compile an additional list of observations from my experiences that might provide insights from a different perspective.

(1) Discussions with urban Head Start personnel indicated they viewed the environment as being nature-oriented, environmental education as being restricted to nature-study, and did not consider this type of program relevant to their curriculum. In contrast, most rural areas already had some sort of environmental education--usually outdoor education--built into their curriculum components.

(2) Although many of the urban programs were located near universities and colleges, there was a reluctance to enter into any sort of cooperative arrangement with university personnel on any matter. (It should be stated that this negative attitude toward involvement with universities was also true in rural programs.)

(3) Repeated requests for consultant service from a local urban Head Start Program gave me an opportunity to conduct in-depth discussions with a variety of people from this urban area. Some sort of "trust" relationship had developed between us enabling us to work together in an open, genuine manner. It was explained that reluctance to work with "outsiders" stemmed from previous experiences which, in the view of Head Start personnel, had resulted in "people coming in and trying to use us to fulfill their own needs." However, on further questioning, it became apparent that the Head Start people

recognized the need for assistance in developing their goals and curriculum plan, but were not able to identify their specific areas of concern. Furthermore, previous consultants had not been successful in assessing the needs of the program. Briefly, the Head Start people felt they needed help but didn't know what they needed help with and resented suggestions that did not come from within their own organization.

From the above "bits and pieces" it was observed that repeated patterns existed that seemed to correspond to systems discussed in existing literature on values clarification; more specifically, the Head Start people seemed to need direction in "thinking through their values in order to assess their own needs and decide on a plan of action utilizing their new knowledge." (Simon, 1972, p 21-22.)

On the other hand, Natural Resource students seemed to need exposure to the diversity of attitudes and values systems that can exist in today's society and to develop an awareness that the success of their program may, at least in part, depend upon their skill in allowing their "clientele" to "think through their own values and weigh the pros and cons and the consequences of various alternatives." (Simon, 1972, p 20.)

Although Natural Resource students had been exposed to values-clarification strategies, no one had attempted to demonstrate ways one can utilize values responses to develop a plan to meet specific needs of a specific group. Students tended to try to indoctrinate others to think as they did about environmental concerns without trying to understand the values that other people might hold, and working from that point in providing their service.

It was also recognized that we, faculty in the School of Natural Resources, were in fact guilty of the same type of methodology. We had been devoting our energies to the teaching of empirical environmental management concepts and assuming that our students would not only come around to our way of thinking but be able to "spread the gospel" successfully in their future work. This plan apparently was having moderate success with people whose attitudes and values were similar, but was in trouble in areas where social-cultural needs differed. Attitudinal differences between the interpretive worker and/or environmental educator and his audience seemed to lead to a lack of communication and loss of effectiveness in the environmental program.

The remainder of this statement is an accounting of the implementation of a Natural Resource course offering specifically designed to provide the student with diverse experiences to:

(1) Increase his ability to recognize the social, economic, and political factors which can affect the urban dweller's attitudes and values toward the environment.

(2) Develop skill in assessing the urban dweller's special needs.

(3) Develop skill in setting program objectives to meet these needs.

(4) Implement an environmental program in the urban community.

Help in choosing appropriate readings was enlisted from the Head Start personnel. They also volunteered to serve as an experimental group for our students.

Values-clarification strategies were employed in both groups for comparative analysis.

It was discovered that both groups were very similar in their responses to Roth's (1969) traditional success strategies and generally fit within his recorded percentages of people polled. A major difference on Question 5 emerged in responses to Simon's (1972) Personal Coat of Arms as follows:

> Natural Resource students tended to choose to live in a natural setting if they had but one year to live and were granted success in whatever they chose to do. Head Start people predominantly chose to further their education and help poor people.

The overall analysis of the Personal Coat of Arms strategy showed that Head Start people tended to be more home and community oriented than did the Natural Resource students.

In an effort to clarify any misunderstanding referring to concepts of environment, the Natural Resource students designed a questionnaire that was to elicit responses on "what one thinks of when he hears the word 'environment'." A survey was conducted in two separate areas--one surrounding a pre-school center in the inner city, and one surrounding a day-care center in a nearby wealthy suburb. Responses were categorized using the Q-Sort technique described by Walker and Lev (1943) which requires consensus on placement of responses and eliminates those responses or categories in which some consensus was not reached. A panel was used to place responses in the following categories:

(1) People, social, economic condition. (Friends, family, neighbors, social conditions, churches, home, etc.)

(2) Physical plant. (Buildings, streets, city services, dogs, proximity to schools and stores, etc.)

(3) Nature. (Green space, trees, pollution, unpopulated, scenic, parks, etc.)

(4) People and physical plant.

(5) Don't know.

Results indicated that inner-city residents tended to think of environment as being "people oriented"--that is, home, family, neighbors, services, schools, etc., while suburbanites viewed environment as being "nature oriented"--i.e., trees, yards, esthetics, etc. (See Appendix for survey questions and results.) It should be stated that the students became aware and announced that they believed their concepts of environment were more closely related to those of the suburban area.

Since there were some differences in concepts of environment between the two groups, it was hypothesized that these differences might result in differences in priorities or sets of values in relation to environmental concerns. The students then embarked on a plan to identify the goals and objectives of the Head Start Program. Simon's Coat of Arms strategy was modified to clarify program values by changing the six questions to the following:

(1) What is the main service you are trying to provide to the Head Start child?

(2) What do you think your program does best?

(3) Who are you trying to reach through the Head Start Program?

(4) What one thing would you like to see done to improve your program?

(5) Symbolize the optimum environment for your program.

(6) What three words would best describe what you would like to be said of the Head Start child?

This modified version of the Coat-of-Arms strategy was utilized as a group effort in both of the participating urban centers. From the responses, a general philosophical statement was developed which indicated that the main objective of their programs was to help the child and his parents relate to and cope with his immediate environment and to encourage the development of a positive self-image. "Health and safety factors" were frequent responses.

Since health and safety are also of great concern to the environmentalist, we now had a common meeting ground. Emphasis was placed on these factors rather than on the traditional approach which had been one of defining the environmentalists' concerns and pre-determining the content of a specific environmental program.

As a result of this new emphasis, it was discovered that one of the foremost concerns in one of the centers was the lack of a playground area for their pre-school children. The nearest park was located seven blocks away and all routes to it were through highly congested traffic areas. The Regional Office of Child Development had informed the Center that a failure to provide adequate playground facilities by September would result in non-renewal of federal funding to the program. There were two vacant lots in the immediate vicinity of the Center but they were overgrown with weeds and being used primarily as a dumping ground by the community. Since they were owned by the Catholic school that rented their facilities to the Head Start Program, it was possible to develop either or both lots into the desired recreational area.

Since this type of project lent itself to the range of the Natural Resource students areas of concerns and abilities, and the Head Start people were in need of expertise as to how to proceed, we had a ready-made project to allow the two groups to work together to achieve a specific environmental goal "(to become) aware of an environmental problem and management alternatives of use in solving these problems; and motivated to work toward the maintenance and further development of an environment optimum for living." (Modified from Roth, et al, 1969.)

The specific project to develop a playground area in the immediate neighborhood of the Head Start Center is not yet completed. The two groups have gained financial support from several community agencies and have developed a plan which includes the two previously mentioned vacant lots, proposed placement of playground equipment, various plantings to add to the esthetic quality of the areas, and a land-lab to be used for outdoor education with both Head Start children and the parochial school children who share the same building facility. The project will continue in the Fall.

Admittedly, Natural Resource students were more interested in cleaning up the lot, proposing plantings, and developing the land-lab than were the Head Start personnel. Head Start people placed priority on the playground equipment. However, as a result of the values-clarification strategies, these differences were recognized from the beginning of the project and did not result in conflict between the two groups. Neither group insisted on changing the other group's priorities; rather, they worked together through their commonalities in an effort to achieve a goal that was ultimately desired by both.

At the end of Spring Quarter, evaluations from both groups disclosed feelings of satisfaction and pride in their efforts--particularly the success in opening communication between groups that had not previously been able to identify with each other.

APPENDIX

QUESTIONNAIRE AND RESULTS OF A SURVEY*

1. What does "environment" mean to you?

Response Category	Urban	Suburban
People, social, economic condition	18	9
Physical plant	4	0
Nature	1	22
People and physical plant	26	17
Don't know	1	2

2. What do you consider a good home environment?

Response Category	Urban	Suburban
Good social relations	34	22
Good physical surroundings	15	14
Natural and pollution-free surroundings	0	7
Natural areas	0	6
Nothing	0	1
No response	1	0

3. What do you like most about your environment?

Response Category	Urban	Suburban
People, social, economic condition	31	23
Physical plant	5	5
Nature	0	12
People and physical plant	3	6
Nothing	10	3
No response	1	1

4. What do you dislike most about your environment?

Response Category	Urban	Suburban
People, social, economic condition	17	17
Physical plant	18	12
Nature	0	10
People and physical plant	1	2
Nothing	13	13
No response	1	1

5. Do you feel your environment is getting...

Response Category	Urban	Suburban
Better	16	10
Worse	16	28
Same	16	11

* OSU Natural Resource Students Survey.

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"WHEN THE EARTH DIES, WHERE DO WE BURY IT?"
OR
APPLYING ENVIRONMENTAL EDUCATION (EE) PROGRAMS TO LOCAL ENVIRONMENTAL MOVEMENTS (EM)

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When the risk of cancer becomes a greater personal threat than a military invasion from a foreign power, Americans may well mobilize politically to support the legislation and resource commitment necessary to cope effectively with environmental contamination. However, without an established environmental movement capable of mobilizing a critical mass of citizens, it may well be too late by then to restore environmental integrity in an orderly manner. This paper will explore some options and challenges for environmental education as it relates to local environmental movements.

Once students leave the academic arena, especially after college, what is the likelihood they will sustain involvement in any sort of environmental movement? There is a tendency among educators to behave as if their responsibility was only to prepare students "to get through college". There is a call in America from large scale organizations such as corporations, for social responsibility. Educational organizations and educators are not immune to this call for social responsibility which requires more than making students aware and getting them through.

Environmental Education (EE) is but one component of the Environmental Movement (EM). Traditionally, the principal contribution of EE to that movement has been to create awareness, among students and the citizenry, of "problems" which might compromise the ability of the physical environment to sustain human life in near and distant futures. Such problems as endangered species; air, water and land pollution; the SST, oil spills, and nuclear power; dangers of unrestricted pesticide use; and urban decay and population density have all been brough to public attention by persons labelled as "environmentalists", some of whom were also more formally identified as educators. In addition to the awareness created by "environmentalists", efforts of varying magnitude have been made (generally outside of EE) to mobilize an environmental constituency to function as a political action arm to reduce some causes of environmental problems.

Earth Day 1970, and the establishment of various new funds, action groups, alliances, and projects served not only to educate, but primarily to mobilize those whose environmental conscience was already formed. These joined a long list of conservation and naturalist associations that had been in existence for some time.

EE and ecology curricula in schools not only generated awareness and problem consciousness, but, generally on a small scale, tapped into existing disciplines to enable students to develop some specific technical skills such as research, environmental monitoring, development of applied technology, and communication techniques, in preparation for emerging role opportunities in environmentally related careers. However, a major premise of this paper is that the EM has remained essentially fragmented and its component parts, including education, basic research, ideology and value formation, organizational development and fund raising for constituency mobilization, political advocacy and lobbying, and applied technology development have all been somewhat autonomous activities.

Environmentalists, including educators, have often specialized in one segment of the movement. Specialization is not necessarily detrimental to the movement's major objectives, but without coordination among the components, and without specialists' familiarity with communications across component areas of the movement, the immediacy of impact and probability of success are eroded. This can be illustrated by reference to lobbyists with technical expertise in one discipline but limited understanding of broader contexts and interrelations, such as biologists who address human population issues as if they were "demographers" and "sociologists," or sociologists who speak on energy as if they were "engineers" and/or "physicists". There often seems to be as much dissension within the EM, such as between "preservationists" and utilitarians", as there is between the movement and the forces of short-term environmental exploitation.[1] Stating this is not meant to imply that unanimity and consensus must characterize the EM. One of the principles of ecology highlights the value of diversity and differentiation. Nevertheless, the ability to coordinate this diversity to achieve at least a minimum of synthesis seems essential. This has occurred at times, such as in the case of local response to the Santa Barbara oil spill, but remains a breach preventing some otherwise attainable long term objectives, such as nuclear power reappraisal, from being accomplished.

The EE component of the movement can serve as an arena wherein greater coordination among disparate specialized segments of the EM can be developed. Students cannot only "be me aware" of the complexity of the EM and its multiple roles, from basic research, to fund raising, to monitoring of legislation, but can invest their learning time in experiencing actual coordination of these component roles. In other words, the "environmental classroom" as the major locus of environmental education at all school levels must be supplemented with the "environmental movement as classroom". This means more than field trips to natural areas, weekend trash pickups, and cosmetic beautification projects. It means the development of the technical, communication, political, organizational and fund raising skills essential to the growth of any social movement.

One of the major prerequisites to local environmental improvement is the development of an established constituency which incorporates all the component roles of the EM in a coordinated way, and which is permanently mobilized in support of the movement's principle objectives. Such a constituency should not exist in a reactive sense only, constantly on the defensive against efforts to exploit the environment for short-term gain, but should continually promote

an ideology containing desirable images of the future. It should focus primarily on the question: "How can we attain what cound and should be?", rather than, "How can a given compromise on environmental integrity be avoided or compensated for?" Supports of the EM must seize the initiative and define the issues. What must be realized is that if such a constituency is required as a basis for local environmental improvement, then one role of Environmental Education is to help develop such a citizenry. This is one in a number of ways. To begin with, the de facto tradition of, as Clifford Knapp puts it, "the bland leading the bland" in education must be ended.[2] EE should offer a student more than "learning for learning's sake". It can provide a unique learning opportunity in which students may not only have a say in the future of their curriculum, but in the future of their communities as well. People respond to a problem to the extent that they understand how it affects them personally. This is one advantage to a community-movement oriented EE program. Students cannot be provided this understanding by teachers, lectures, or any other source alone. They cannot be "taught" an environmental perspective. George Leonard stated this well when he said,

> "We have been taught in school that increasing human control of the non-human world has brought us leisure and art and culture and freedom from want. We have not been taught that control over nature has also meant an equivalent control over human beings. We have not been taught that whatever we have gained in dominance has been paid for with the stultification of consciousness, the atrophy of the senses, and the withering away of being. We have not been taught because the whole business of being taught is itself part of the price we have paid and are still paying".[3]

In well designed EE curricula, students deal, instead, with local problems and issues that effect their lives and through that exposure are able to develop a personal, life-long commitment to their social and natural environment. The challenge for environmental educators is to accept the idea of 'no more teaching' to passive recipients of information and to replace standard teaching, as Jane Schautz puts it, by "transforming the spectator into a participant." Such an action can only serve to support an integrated local EM.

At the college level especially, but not exclusively, it seems reasonable to suggest that the development of the EM in its many components is also a principal objective for those in EE. Hence, conditions for the success of the EM become important to the EE process. It is proposed that those conditions can be facilitated by the EE curriculum content and processes. In fact, it is from the conditions for success of the EM that EE curriculum developers can take useful cues as to what learning opportunities need to be made available to students. In short, EE curricula ought to be a function of the conditions necessary to develop a successful EM. What these conditions are and what their implications are for EE curricula will be discussed next.

Recent experience with an economic recession has provide an opportunity to assess the degree to which the EM has become established as an integrated, well-mobilized social movement capable of contributing effectively to the determination of local, state and national priorities.[4] It is apparant that the EM lacks the critical mass of resources to compete with narrowly defined economic problems.

Social movements, of which the EM is but one example, succeed or fail according to the ability of their proponents to develop and integrate the following resources:

1. An image of a desirable future, which includes values and an integrated ideology.

2. knowledge and information about the forces defining, constraining, and moving the arena in which movement members operate (including an inventory of potentially useful community resources).

3. personnel with technical skills such as, specialized knowledge, organizing ability, or communication techniques.

4. an organization which focuses and coordinates resources so as to make desirable objectives appear attainable.

5. resources such as energy, often manifested as dollars, and

6. a responsive constituency, not necessarily a part of the movement, but segments of which are capable of being mobilized to actively support any specific movement issue.

Students moving out of EE programs should have sufficient skills, experience, and motivation to participate fully in the EM. Only an action based, community centered, learner developed program can facilitate such a preparation. If students see their training as enabling them to participate effectively in the EM, whatever their career involvement, they are more likely to participate than if their studies in EE were just another standard academic subject. Although new career and job roles are expaning in the environmental area, graduates are needed who are capable of taking the initiative to develop local EM's in new, as yet unmobilized, territories. The chances of them doing this will clearly depend upon their confidence in their EE background.

To the extent EE programs get students out of the classroom, what is often involved are efforts to get them to "experience" the natural world. This is essential, but not sufficient. Activities such as community organization, organizational financing, lobbying, legislative drafting and critiqueing, and effective mass media use, must be viewed as important as "being aware", being able to test water quality, reading impact statements, or experiencing nature. It should be a goal of EE to develop members of the EM out of students, not to make "students" out of members of the EM.

Sometimes students attracted to EE and Ecology programs are trying to get away

from what they consider to be constraining and uncreative roles of a bureaucratic society. Yet it is some of the very activity and skills associated with these roles, such as program development, fund raising, personnel recruitment, and research, which could enable the EM to coalesce into a more effective and prominent social movement. Hence, EE curricula ought to contain courses on planning, law, monitoring and index construction,[5] mass media and communication, public administration, the scientific method, fund raising, community organization, futurology, and philosophy. It is easy to list courses which ought to be included in an "ideal" curriculum. But how can such programs, if desirable, be fielded where on-campus resources are, and will remain, limited? A large "in-house" staff directly participating in EE courses is not necessary before students can get exposure to these topics. The professional and especially non-professional expertise and resources that exist in a local urbanized community often go unrecognized, such as planning agencies, attorneys experienced in environmental law, public health officials, governmental agencies (e.g. U.S. Geological Survey, EPA, State Department of Natural Resources, and County Agricultural Extension Agents), conservation and naturalist associations, League of Women Voters, Union organizers, professional fundraisers, communications media, various rights and liberation groups, and many others. In addition, all campuses have Development Offices, Public Relations Departments, research grants offices, admissions recruiters, and physical plant personnel, who can be tapped to share some specific skills or techniques of their trade which could be useful to persons entering the EM.

Within any curriculum structure there are many and varied ways of facilitating active participation by students. Applied monitoring projects, concentrated internships, real problems research, resource inventorying, scenario construction, legal critiques, and professional meeting attendance and participation can be added to field trips, audio-visual materials, good texts and knowledgeable guest speakers. The combination of experience, understanding, imagination and skills development, would facilitate continued participation in the EM by students after graduation, regardless of career involvements.

None of us is immune to the encapsulation that results from the limited and selective observations and experiences which accompany our network of personal associations and use of disciplinary perspectives. The kind of program outlined above may help students overcome some degree of that encapsulation by providing them the opportunity to test concepts, principles, techniques, and values in the arena where folks are "playing for keeps".

If the fragmentation of the EM is to be healed before its utility is "too little, too late," then EE must map its programs around the needs of that movement.

At this time, the prime need is for a synthesizing ideology and positive image of the future which can motivate and direct efforts towards enhancing continuation of the human experiment. We need to "plan the future", rather than "plan <u>for</u> the future". The latter suggests a defensive action in response to events and patterns which those who are effected did not design, but rather which confronted them due, in part, to the fault of the EM. Fred Polak, the Dutch futurologist, has studied the role of images of the future in the rise and fall of civilizations. One of his many intriguing observations is the degree to which futures have emerged which look like images of the future from times.[6] In the light of Polak's inquiry, it is interesting to note that

most Americans under 25 years old have grown up on images of the future which are distinctly dystopian (e.g., Brave New World, 1984 and Farenheit 451) by current cultural standards of the desirable. Simultaneously, major global movements such as capitalism, socialism, and christianity have appeared to lose much of their earlier motivating power as projections of desirable futures.

The very existence of an EM implies a hope needs to be transformed into positive images of the future towards which momentum can be developed. EE programs have a role in both the creation and fulfillment of such images.[7] Our commitment to realizing them, even at the expense of other attractive objectives, will be a function of the degree to which we participate actively in their making. Hence, the "environmental classroom" needs to be supplemented with the "environmental movement as classroom."

FOOTNOTES

1. For an excellent review of the history and nature of the environmental movement in the U.S., see, David L. Sills article, "The Environmental Movement and Its Critics", in Human Ecology, Vol. 3, No. 1. 1975, pp. 1-39.

2. See Clifford E. Knapp, "Teachers and Students as Environmental Communicators", in What Makes Education Environmental? edited by Noel McInnis and Don Albrecht, Environmental Educators, Inc. and Data Courier, Inc. 1975, pp. 209-217.

3. From George Leonard, The Transformation, quoted in "Behavior: Practice vs. Preach Syndrome," by James Swan in McInnis and Albrecht cited above, pp. 202.

4. For one view on the development of social movements, see James A. Geschwender "Explorations in the Theory of Social Movements and Revolutions", in Issues, Debates, and Controversies": An Introduction to Sociology, by George Ritzer, Allyn and Bacon, Inc. 1972, pp. 197-210. Sills, in the article cited earlier, also analyzes the environmental movement as a specific example of a social movement.

5. For a discussion of the importance of having highly visible monitoring indices see, T. D. Harblin "When the Earth Dies, Where Do We Bury It? or Environmental Depletion and Renewal Indices: Much Needed Public Policy Guides", a paper presented to the Second General Assembly of the World Future Society, Washington,D. C. June 2, 1975.

6. See Fred Polak, The Image of the Future, translated and abridged by Elise Boulding, A Jossey-Bass/Elsevier Book, 1973, 319 pages.

7. For a detailed attempt to spell out some core values of a positive image of the future based on principles of ecology, see, T. D. Harblin, "Values and the Environment: Probable Sources of Change in the Next Hundred Years", an address to The Institute on Religion In An Age of Science Conference, "The Ecosystem, Energy, and Human Values: The Next 100 Years", Winter Park, Florida, March 19, 1976.

AN INQUIRY INTO THE IMPORTANCE OF STUDYING VALUES IN ENVIRONMENTAL EDUCATION AND THE MEANS FOR DOING SO

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Many people in the U. S. seem optimistic that environmental problems will easily be confronted and solved. All that is necessary, they believe, is to apply technological knowledge to problems and they will go away. Environmental problems, from this perspective, are simply biological, physical and chemical problems that have resulted from inadequate application of technological capability. These people believe that scientists and technologists, given time and money, will overcome the difficulties.

Many students of the problems are not so optimistic. They recognize that in many ways the disruptions of the ecosystem are merely symptoms of underlying social and cultural problems of belief and value. Willis Harman, for example, notes that "the various aspects of the world macroproblem are appearing more and more like surface manifestations of a pathogenic condition lying beneath the surface." (9:8) George Leonard argues that the paradigm of Western man is riddled with "myths" such as growth, fertility, inevitable competition, and separate species all of which, among others, contribute to the environmental difficulties presently confronting the society. (15:127-47) Robert Theobald contends that the very idea structures of Western man, the linearity of his thinking, the structural nature of his authority, and the inequitable and growth-based nature of his economics, underlie the environmental woes of the developed countries. (32) And the recent "Limits to Growth" studies indicate that the socio-economic system based on growth operates within generally definable environmental parameters and must give way to a system of "global equilibrium" which will be difficult of attainment. (19) All of these students of the "environmental macroproblem," and others, recognize that this problem is the consequence of a rich and long cultural history which determines the way Western men perceive themselves, the environment, and their place in that environment. (5, 6, 11, 28) Further, they conclude that change in thinking and environmental perception is going to be necessary for solution of the problem, and that such will be very difficult to attain due to the natural resistances to change of individuals and institutions. When viewed from this perspective, the struggle to identify and implement programs for solution of environmental problems looks like a long and arduous one.

Examination of the underlying sociological and psychological aspects of environmental problems eventually leads one to the problem of values. Men and institutions are faced with the necessity to make decisions that affect the quality of the environment, and these decisions are, to a varying extent, influenced by the prevailing valuative norms present in the individual or the institution. Often, according to some students of the problem, the values held by the decisionmaker affect his perception of his environment and lead to the wrong decision from the environmental quality standpoint. It is, therefore, important to study values and their relationship to environmental problems.

First, a definition of the problem is in order, beginning with a definition of value, which is no small task in itself. It may be defined in several ways, all of which bear upon the problem being considered here. A value, according to the anthropologist Kluckhohn, ". . .is a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available modes, means, and ends of action." (23:395) In this definition a value is a rather hard and fast entity, an identifiable position in relation to a range of alternatives.

A second definition is in terms of the process of valuing itself. Here the work of educational theorists, among them Rath, Harmin and Simon (27), is important. They have studied the processes by which people achieve their valuative stances and developed a theory of valuing which they summarize as follows:

> "To review this definition, we see values as based on three processes: choosing, prizing, and acting.
>
> Choosing: 1) freely
> 2) from alternatives
> 3) after thoughtful consideration of the consequences of each alternative
>
> Prizing: 4) cherishing, being happy with the choice
> 5) willing to affirm the choice publicly
>
> Acting: 6) doing something with the choice
> 7) repeatedly, in some pattern of life
>
> --These processes collectively and behaviorally define valuing.

Results of the valuing processes are called values." (27:30) This definition derives from their observation that values come from the constant interplay of experience and change and that "As guides to behavior, values evolve and mature as experiences evolve and mature." (27:27) They therefore do not concentrate their attention on Kluckhohn's "conception," but rather on the dynamics operating on that conception, which they summarize in their three processes. They feel that it is important, when looking at values, to ". . .consider the posture of a person facing his world, how he uses his muscle and spirit to relate to his surroundings." (27:10) They are concerned about how men go about the task ". . .of deciding what is good and what is right and what is worthy and what is desirable. . ." (27:7) and have developed their theory to explain this process in operative terms.

Values are not only operative processes and identifiable entities in individuals but also have collective force in the operation of societies. Clyde Kluckhohn has also noted, after Bateson, that "There is a 'philosophy' behind the way of life of every individual and of any relatively homogeneous group at any given point in their histories." (24:409) The principles of this philosophy, he contends, ". . .arise out of, or are limited by, the genius of biological human nature and the universalities of social

interaction." (24:409) Thus people in specific groups derive a part of their individual "mental-feeling outlook" from the "lifeways" of their group. This outlook Kluckhohn calls a "value orientation" which he defines as ". . .a generalized and organized conception, influencing behavior, of nature, of man's place in it, of man's relation to man, and of the desirable and nondesirable as they may relate to man-environment and interhuman relations." (24:411) Thus a "value-orientation" is a constellation of values, of conceptions, that are "organized" into a system of belief which influences behavior, blending norms and "existential premises." Most important in pursuit of the definition of value here is Kluckhohn's recognition that values are characteristic of groups as well as individuals, that they are organized into belief systems, and that the prevailing valuative normative belief systems of groups influence the values of individuals.

There are several qualities of the problem of values that emerge from this attempt to define "value" on the way to defining the problem. Valuing is a process, involving selection of action from alternatives, operative in both individuals and groups, which provides a perceptual organization of the relationships of man to nature, man to man, and man to self. Values enter into environmental problems when: 1) the valuative process breaks down leading to confusion about what to believe in; 2) the beliefs about man-nature and man-man relationships that influence the selection of alternatives of action are out of touch with current reality and, therefore, contributory to the degradation of environmental quality; 3) the actions selected by individuals and groups from a range of alternatives contribute to degradations of environmental quality. Any attempt to deal with the "condition lying beneath the surface" begins with clarification of the nature of these aspects of the valuative problem.

Confusion of Values

Numerous students of the contemporary scene have noted an erosion of the significance of "traditional" values. Harman notes that "The basic assumptions, values, and goals implicit in the nation's founding clearly fail to inspire the allegiance they did some generations ago." (9:14) He attributes this situation to several factors. Many people, particularly the young, observe that the nation and its leaders today do not live by these historic assumptions, goals, and values. Further, they believe that science "has shown to be a myth the fundamental premises implicit in the Western political tradition" such as moral order in the universe, intrinsic freedom and equality of men, and a purposeful history and evolution. (9:14) People holding these views are precipitated into a state of confusion and uncertainty as to how to order and limit their behavior and even to justify their being.

Value theorists in education, such as Rath, Harman and Simon, note a moral and ethical confusion in the society which they attribute to reduction of the importance of the family, increasing levels of input into learners through advancing technologies of communication, reduction in the importance of the Church, and other factors. They comment upon the situation among children.

> "Could it be, we wonder, that the pace and complexity of modern life has so exacerbated the problem of deciding what is good and what is right and what is worthy and what is desirable that large numbers of children are finding it increasingly bewildering, even overwhelming, to decide what is worth valuing, what is worth one's time and energy. Life is certainly less neat and simple than it was even a few generations ago. 'A perfection of means and a confusion of goals' is the way Einstein characterized this age." (27:7)

Their work with children has uncovered significant problems of value which they believe are at least partially responsible for behavior difficulties in some children.

Alvin Toffler, Philip Slater, Ralph Keyes, and other students of the contemporary sociological scene also note valuative difficulties developing in modern life. Toffler argues that increasing rates of social change impact disruptively on some people. (33) Packard examined mobility in modern society and noted more specifically what he called the "community of strangers" phenomenon which involved a constant uprooting of people with various confusions resulting as both children and adults moved from one geographic and social setting to another with great rapidity. (23) A problem of identification results from this constant uprooting, both in terms of identification with a social group which imparts a value system, as was the case with the extended family in a less mobile era, and identification with a physical, geographic place which also once contributed to a firm valuative foundation. Ralph Keyes has noted a reduction in community and the values associated with such because "A community simply cannot be built from people crouched and ready to take off, like foot racers awaiting the crack of a gun." He believes "community" essential to reduction in human confusion, and community can be forged from people trying to make up their minds about whether to belong, community-seekers who keep their bags packed and ready." (12:185)

In short, some people in contemporary society feel themselves cast adrift in a sea of uncertainty regarding their beliefs and values. They find themselves groping for meaning in a lifestyle that seems frenetic in pace and directed toward uncertain ends. Young people are skeptical of the value of the goals pursued by their parents, and the parents themselves are gripped by doubts generated by a kaliedoscopic array of environmental, social, economic and moral problems facing them. There is abroad in the land a general loss of faith in ideals and a cynicism and disillusionment about the character of modern men and their institutions.

All of this leads to a situation in which, to use the process definition of valuing, people are having difficulty choosing values and acting upon them. There are too many choices. Too many people seem to choose and prize one value today, then reject it to choose another, often contradictory value, tomorrow. Some people, even leaders in high position, affirm loudly values which their actions do not support. The overall effect of this situation, particularly for young people groping for a firm

and satisfying system of belief, is a confusing and bewildering one often driving people to positions of disillusionment, retreat, and confusion.

Beliefs Out of Touch with "Reality"

Kluckhohn, as noted earlier, maintained that value orientations involved conceptions of nature and of man's relation to it which in turn influenced decisions as to desirable and non-desirable behavior in man-environment relations. Since man's behavior in his environment today is disruptive, perhaps this is a result of incorrect conceptions about man's relationship to environment.

Willis Harman, for instance, has noted that much behavior today operates on premises that are problem generating. These premises are implicit and have evolved over long periods of human history. One of these is "The premise that man is separate from nature, and hence that nature is to be exploited and controlled rather than cooperated with." (9:5) This separateness premise may have roots far back in the cultural and religious history of Western man. So argues Livingston, who hypothesizes that ". . .the essential underpinning of the conceptual man/nature dichotomy (developed) long before there was Homo sapiens, and quite probably before there was Homo." (17:132)

Lynn White, Jr. and others have argued that the conception of nature which appears in Genesis where man is seen as having dominion over the earth and its creatures has contributed to this premise. They argue that this conception contributed to belief in progress and action which resulted in development of technology, science, and an increasingly significant man-nature separatism. (35) In recent years studies of man-nature relations has indicated that this conception of man-nature separateness is incorrect. Man is a part of the biosphere and its component ecosystems and is dependent upon the effective functioning of the biosphere for his sustenance. He has come increasingly to understand that the concept "community" includes not only the family of man, but other biotic and abiotic components as well. (16) Action based on the conception of man-nature separatism has resulted in negative feedback which has been clearly perceived in recent years.

Another important misconception about the man-nature relationship is revealed in the use of the term "side effect," as discussed recently by Hardin. Men have long failed to perceive the environment as a system of interrelated parts. Thus, when they have identified a problem to be solved or an objective to be reached, they have simply developed a strategy by which to achieve the desired goal, or "effect." Other effects of the action necessary to achieve the goal have been called "side effects" and regarded as unimportant. Hardin, calling this use of the term effect "word magic," has provided a good example of the fallacy of this idea about nature.

> "'Side effects' is most potent word magic. The Zambezi River in Africa was dammed, with world bank financing, to create the 1700 square-mile Lake Kariba. The effect desired: electricity. The 'side-effects' produced: 1) destructive flooding

of rich alluvial agricultural land above the dam; 2) uprooting of long-settled farmers from this land to be resettled on poorer hilly land that required farming practices with which they were not familiar; 3) impoverishment of these farmers and 4) the migration of many of them to city slums; 5) social disorder of uprooted, impoverished people; 6) creation of a new biotic zone along the lake shore that favored the multiplication of tsetse flies; 7) trypanosomiasis (sleeping sickness) among humans; and 8) overall diminution of protein supply of the region." (8, 68)

In a system it is not possible to carry out only one action. The whole system is affected, as Hardin's example points out. There are myriad other examples that might be used to substantiate this point.

The conception of a natural world that operates in a simple linear fashion is thus seen by ecologists and other systems thinkers to be incorrect. The one cause--one effect conception of reality is a misconception. As Hardin puts it, "You can't do only one thing." It becomes desirable, in view of this, to pursue a mode of action which is conservative, which involves assessment of the cost and benefits of the "side effects" as well as the desired effect. Value, thereby, is placed on "systems" thinking rather than on linear thinking.

The point here is that some parts of the prevailing value orientation in American society are based on dated and incorrect beliefs about the nature of humankind. From an ecological perspective, man is nature and there can be no denying it. Patterns of behavior that have evolved on the assumption of separatism lead to environmental trouble and must change. There is great personal and institutional resistance to such change, because it disorders prevailing behavioral and ethical norms. Yet the emerging perception of ecological reality issues a mandate: bring human behavior more into line with this newly perceived reality.

The Value Choice and the Outcome

People are constantly choosing from among a range of alternatives, and choices made by people out of touch with ecological reality in recent years have resulted in environmental deterioration. The "bigger is better" mandate has led people to choose bigger cars with bigger engines which has led to increasing consumption of nonrenewable resources and increasing air pollution. The decision to measure quality of life by means of "standard of living" measured in income and per capita consumption in the U. S. has led to constant striving for more goods and services and emphasis upon growth in production and consumption at all levels of society. This has resulted in grossly uneven distribution of the world's resources domestically and internationally, to emphasis on materialism, to increasing amounts of solid waste and other forms of pollution, to spiraling increases in energy consumption, and to a variety of other effects.

Communities have chosen to define their health in terms of their growth in size and industrial output. Thus they have worked to attract industry which has increased the population which has in turn necessitated more housing and other services and so forth until many valued qualities of the community have been changed or lost. Many times the scramble for economic growth in a community has proceeded at such a frantic pace that other values, such as the historical, scenic, recreational, and ecological have been ignored and often destroyed. The options in terms of lifestyle have thus been reduced for people in the area.

In yet another decision people have chosen speed and convenience in transportation over their alternatives. This has led to highway systems which have disrupted landscapes and socioscapes and which allow people to move faster thus contributing to a faster-paced lifestyle. People speed through the countryside, bent on some distant objective, often oblivious to their surroundings. The choice of convenience has led to the proliferation of the private automobile with all of the "side effects" that are well known. The recent energy "crisis" demonstrates the difficult situation into which decisions to value speed and convenience in transportation have precipitated the United States and the world.

Commonly people examine the decision before them in terms of immediate and personal outcomes. The desirable outcomes are presented by the industrial and commercial interests through the medium of advertising. People choose the alternative that will maximize the benefits that they personally seek at the moment. They conceive of the "cost" of their choice primarily in economic terms, to their personal bank accounts, and in the present. Thus they perceive the effects of their value choices in a narrow frame of reference. Increased knowledge of the way in which nature, society, and the individual are organized and function has recently resulted in increased awareness of the effects of valuative decisions upon the environment. The severely disruptive character of many such decisions has become obvious, but solutions to the problem are regarded as painful and as therefore less obvious.

The range of viable choices of lifestyle has been narrowed in recent years by a permeative communication technology which, through its advertising, establishes valuative norms. Thus people residing at all socioeconomic levels, for example, measure their welfare in terms of a standard of living depicted on television. Some find themselves above that level of welfare, most below it, but all take it as a measure of well being, the former congratulating themselves on their good fortune and/or luck and the latter resolving to work, strike or steal with greater dedication in order to raise their position. All use material things like automobiles, houses, campers, and clothing to measure their welfare. They exchange that most limited of all resources, time, for money which is in turn exchanged for goods and services.

The point here is that the range of choice of measures of welfare has been narrowed for many people by such ideas as "bigger is better" and "the measure of value is money." Social institutions in the modern

developed world are established on such ideas, and deviation from them may lead to disruption of these institutions and consequently to pressure to conform. A person who feels the prevailing values inadequate has a difficult time searching out alternatives and adopting them. Most people are aware of this difficulty and few have the courage and resolve to follow the less traveled road.

Some of the outcomes of the valuative decisions thus made reduce environmental quality and erode the quality of the life experiences of many people. This is not to say that advances in technology in recent times have been bad, but rather that they have not been unmitigated good when examined from the environmental perspective. The system of value based on money and profit and short term gain and creature comfort is simply inadequate to measure welfare, yet it dominates decision-making today, with negative results in many environmental arenas.

These then are three problem areas, all interrelated and overlapping, which comprise the problem of values which underlies the problems of environment that are of concern today. It is suggested here that values are learned through the educational processes of a society, and that education, therefore, has an important role to play in alleviating the problems identified above. Confusion may be lessened by increased efforts to clarify value choices. Dominant values can be assessed for their consistency with ecological reality and the outcomes of this assessment integrated into processes of values education. The outcome of this work in education may be less activity that damages the environment.

Value Study in Environmental Education: Three Approaches

The importance of value study in environmental education has been noted by Stapp (30), Cummings (4), Knapp (13:1-174), and others. Stapp notes that the "two basic processes that are an integral part of environmental education are problem-solving and valuing. These processes, particularly the latter, lead to the learning of skills which are necessary for coping with problems in general. The skills include problem definition, generating alternative solutions, and evaluating these alternatives and their effects." (30:12)

Stanley Cummings has examined the process of environmental education and noted the central importance of valuing. He proposes a methodological model which involves a decision-making approach and extends to an actual behavioral response.

> "Science no longer attempts to teach its methods out of context and problem-solving or inquiry should not be removed from the context of decision-making. To do so would be to ignore one of environmental education's most valuable contributions. In decision-making, problem solving is integrated with a valuing process. Valuing is the link between thinking and action. It transcends pure reason by including the non-rational (as opposed to irrational) with the rational. Thinking may help us to see the

alternatives which are relevant, and valuing helps us in the process of choosing from among alternatives." (4:18)

The act of choice involved in decision-making is the central behavior of this approach, so this process of choice and the behaviors following therefrom should, in Cummings' view, be of central concern to environmental educators.

Steffenson notes the importance of a value structure that is in tune with both short and long-term environmental realities. He quotes Jay Forrester who notes that "To survive, a society must have a long-term value structure to counteract the short-term pressures. Without the long-term values, 'living for the present,' if carried to an extreme, makes the future impossible." Steffenson is not quite sure how such a long-term value structure can be achieved but notes that "Students need help in verbalizing values so they can at least be examined," and ". . . we can help our students bring their values to the surface, examine, and compare them, consider consequences, and explore possible alternatives." (31:9) Environmental educators can and should do at least this much.

Review of the literature of environmental education reveals a general awareness among writers that values should be of central concern to environmental educators, yet there is at the same time evident reluctance to delve deeply into this controversial and difficult-to-quantify realm. Those who have done so have largely adopted the approach to value study called "values clarification," a process approach to value study developed by Rath, Harmin, Simon and others that was mentioned earlier in this paper when "value" and "valuing" was being defined. Stapp (30), Knapp (13), and Bennett (3) have published examples of values clarification in the environmental education literature. The "Valuing the Environment" program of the Charlotte-Mecklenburg Public Schools in Charlotte, North Carolina (34), and "Project Learning Tree" (26) have also integrated values clarification into their environmental education approach.

Values clarification is one fruitful approach to value study in environmental education, and it is the one most broadly utilized, but there are other approaches available that have not so far been explored by environmental educators. Analytical models for value study, principally for social studies education, have been developed by Hunt and Metcalf (10), Newmann and Oliver (21), Metcalf (20), Oliver and Shaver (22), and Banks and Clegg (2). These models emphasize systematic exploration of an issue and involve students in a systematic step-by-step analysis of a problem. They go beyond values clarification and call not only for clarification of a student's value position but demand also that they ". . .explore in a systematic manner the decision that may be made concerning the value question or policy decision. . .to learn skills in the areas of discussion, data collection and hypothesis testing." (7:212)

A third fruitful approach to value study is that developed by Lawrence Kohlberg (14). He has developed a typology of moral thinking in children in a longitudinal and cross-cultural study. He notes,

"We can speak of the child as having his own morality or series of moralities. Adults seldom listen to children's moralizing. If a child throws back a few adult cliches and behaves himself, most parents--and many anthropologists and psychologists as well--think that the child has adopted or internalized the appropriate parental standards.

Actually, as soon as we talk with children about morality, we find that they have many ways of making judgments which are not 'internalized' from the outside, and which do not come in any direct and obvious way from parents, teachers or even peers." (14:132)

This has led him to propose an approach to moral education in which the teacher presents the student with a moral dilemma and asks how that person would resolve it. The student's response to a number of such dilemmas would indicate his level of moral development and the teacher could then structure new dilemmas which might open new levels of moral reasoning for the student.

Kohlberg identified stages of moral development which seem to represent an "invariant developmental sequence" which move forward without skipping steps. These steps lead toward ". . .an increasing morality of value judgment, where morality is considered as a form of judging. . ." (14:139) In the early stages morality is egoistic, culture-bound, and even accidental, while at the higher levels it is universal and consistent. It consists of comprehensive and integrated principles at these higher levels which "have gone by the name of justice." Kohlberg's conclusions about moral behavior are, "In our studies, we have found that youths who understand justice act more justly, and the man who understands justice helps create a moral climate which goes far beyond his immediate and personal acts." (14:143)

If the goal of environmental education is an environmental ethic and an ecological morality, then its goal is also a value orientation characterized by justice. The meaning of the idea of justice has been explored thoroughly in the man-man component of value orientation, and less so in the man-nature component. Even so, if it is hypothesized that justice on the social scene is a prerequisite to justice on the ecological scene, then the importance to environmental education of Kohlberg's contribution to moral education is evident. It goes well beyond values clarification in its scope and objectives. Each of these three approaches will be examined, beginning with values clarification because it is a tool important to the other two.

The Values Clarification Approach

This approach includes the three action phases of choosing, acting, and prizing. Its value theory

". . .is based on a conception of democracy that says persons can learn to make their own decisions. It is also based on the

> conception of humanity that says human beings hold the possibility of being thoughtful and wise, and that the most appropriate values will come when persons use their intelligence freely and reflectively to define their relationships with each other and with an ever-changing world. Furthermore, it is based on the idea that values are personal things if they exist at all, that they cannot be personal until they are freely accepted, and that they cannot be of much significance if they do not penetrate the living of the person who holds them." (27:39)

Rath, Harmin and Simon note that traditional approaches to teaching values include: the setting of an example to be emulated by the learner; persuasion and an effort to convince; the limiting of value choices, inspiring; rules and regulations; cultural or religious dogma; and appeals to conscience. (27:39-40) They regard these approaches as inadequate to cope with the contemporary "crisis of values" and suggest that the process of values clarification is one way to transcend these inadequacies. It allows people to examine the range of alternative value positions available to them and gives them the chance to choose from them.

The process consists essentially of posing a problem of valuing to the student in an environment which is open and free from threat; urging the student to identify his/her positions on the problem, providing the opportunity to view a range of alternative value positions; and allowing affirmation and action upon the value position taken. The approach involves no normative judgment of right and wrong or good and bad, but gives the students insight into the difficult value issues before them, into their personal position on the issues, and gives practice in the process of perceiving and evaluating alternatives. Thus they gain skill in decision-making which is so essential to working on problems of all kinds.

A simple example directly from Simon et al of the approach is a strategy called "Rank Order." The procedure is that the teacher asks the class questions and provides them with three or four alternative choices for responding to each question and asks them to rank order these choices according to their own value-laden preferences. A number of students are called upon to give their rankings, and discussion is then held in which students explain the reasons for their choices. A sample rank-order question potent with environmental education potential would be:

> Which would you give the highest priority today?
>
> _____space programs
> _____poverty programs
> _____defense programs
> _____environmental control programs (29:59-60)

Hundreds of strategies for values clarification have been developed, all of which are important to environmental education for the practice of valuing which they provide. Few strategies designed directly for integration into environmental investigation can be found in the literature, but once one has studied the clarifying process it is not difficult to adapt it to whatever problems students are examining. A few examples of

strategies adapted specifically for environmental study include the following:

A. A community college group is examining energy supply and demand in the United States. After several hours of lecture and factual presentation, they engage personal dimensions of the issue. They are given instructions: Make a list of 12 things that you personally use around your house which use electricity. This includes anything electrical which you use frequently.

Draw a line through the three things which you could live without most easily.

On the other hand, which three do you find most necessary and would have the most difficulty giving up. Circle these.

Break into groups of four and compare and discuss your lists. (29:383-4)

B. Returning to your list, consider how much electricity each of your 12 items consumes in normal usage. Here is a list which gives you figures for average wattage requirements for appliances which you can use to calculate usage requirements of your items.

You are ordered to cut your electrical energy consumption by 2/3. You can use as many electrical appliances as you wish, but you have an absolute quantity limit within which to work. Assign energy values as well as you can to the items on your list. Add up all of these values, multiply by .33. The figure you thus derive is the pool of wattage from which you can draw. The values you have given the appliances are average annual wattage requirements, so assume you are an average user and don't worry about relative amounts of usage. Now make your selection from among your uses as to how you will personally allocate your reduced supply of electricity.

After you have made your selection, discuss your choices with the others in your small group. Discuss also the hypothetical feasibility and social impact of such a reduction of energy consumption.

C. Divide your paper into 5 columns. In the first column, list 6 people who are very close to you. They can be family, friends or others. They ought to be 6 people who touch your life frequently and with intensity.

In the 2nd column, write the gift you gave that person last Christmas. If you didn't give them a Christmas gift, recall a gift that you gave them on some other occasion. If you haven't given them a gift, leave the space blank.

In the 3rd column, list a gift you could give each person that would dramatically change some aspect of that person's energy-related behavior. Perhaps it would be the gift of "Being able to take more time going places," or "Enabling that person to get more exercise." Give each person a gift which you think would make him/her happier. Do not make this a tangible gift like a bicycle, but rather "the exhilarating experience of hearing the birds as he goes to work each morning."

In the 4th column try to identify some tangible gift you could give each person that would help him/her achieve the behavior (gift) you listed in the third column. (Here you may give the bicycle.)

Finally, in the last column, list a gift that each of these people could give <u>you</u> to change one or more of your energy-related behaviors. Try to imagine what behavioral change each of the people you listed would like to endow you with. More than one person can give you the same gift. If you think you would get the same gift from all 6, it tells you something important.

Now go to your groups to discuss what the members of the group gave and received as gifts. (29:353-4)

D. Students in a college course titled "Alternative Futures" begin their inquiry in the course by doing an exercise called "Planning for Living." The exercise is assigned so that students can encounter the concept "future" in a personal way and so that they can begin to assess personal goals and plans in the light of this concept. As the course progresses they will decide on "desirable" alternative futures, a process that will involve valuing in decision making. The exercise is based on activities developed by Pfeiffer and Jones (25:113-126) and requires that the students do the following:

<u>Part I Where Am I Now?</u>

1. Draw a line that depicts the course of your life much as a business charts its progress or lack thereof. The line should depict the past, present, and future. On this line mark an X to show where you are now.
2. Write a brief explanation of the lifeline that you have drawn. When the other members of your triad have finished this exercise, share these data.
3. This exercise is called "Who am I?" Write down on this page fifteen adjectives which describe yourself most accurately at the present time. Then, regroup your list of adjectives into the following categories: Positive, Neutral, Negative. Having done this, share these lists with your triad.

<u>Part II Where Do I Want to Be?</u>

1. What are the ideal attainments that you hope to achieve in your lifetime? Be as honest as possible in describing these goals, and write them down on this sheet.
2. Assign a priority value to each of your goals. Using the following four-point scale, write the appropriate value in the space provided for each goal.
   (1)--of little importance
   (2)-- of moderate importance
   (3)--of great importance
   (4)--of very great importance
   Share these goals and the priority values with other members of your triad.

Part III How Do I Get to Where I Want to Be?

1. From the list of goals which you have recorded and prioritized, select one for detailed planning. Establish a program, with component steps and deadlines, for attaining each of these objectives. When you have made your selection and worked out the program, share it with the other members of your triad.

Part IV Fantasize Your Personal Future

1. Fantasize an average day in your life which you expect will occur twenty years in the future. Describe your lifestyle and summarize your activity of that day. Write this up, and when everyone has done so, share your fantasy with the other members of your triad.
2. Now, fantasize an ideal day in your life twenty years in the future, in a world which you hope will come to be. This is your Utopian dream. Describe this day and then share this fantasy with the other members of your triad.
3. Finally, write the obituary that you hope someone will write of you when you die. This involves fantasizing your life history to its end point. Build your fantasy on your previously developed goals and personal planning programs. When you have completed the obituary, share it with the other members of your triad.

These few examples illustrate how the values clarifying process can operate in environmental studies. They are simple modifications of existing strategies and have been very successful in revealing to students problems of values involved in the making of personal decisions regarding behavior in the environment. Such exercises also have provided excellent springboards for discussion of important environmental issues and concepts.

The challenge of this approach to studying values is to find ways to integrate values clarification exercises into the curriculum at all levels whenever appropriate. Clearly the most effective way to utilize the approach is not to say, "Now we are going to clarify our values," but rather to simply move to an exercise in our science, social science, or humanistic studies which will explicate valuative options without perhaps even mentioning "values." This is consistent with the view of environmental education which holds that the entire environmental education process should be integrated into existing curricula in such a way as to unify this curricula rather than be a separate course or unit. It derives from the theory that perhaps the fragmentation of knowledge, the separateness that marks a disciplinary approach to knowing, has resulted in a perceptual inability to perceive wholeness which in turn has contributed to ill-advised decisions about man-environment transactions. Thus one of our tasks is, as Noel McInnis has put it so succinctly, to "think our world together." (18) From this perspective it is advisable not to separate environmental education and value study from the other learning tasks being undertaken.

An example will clarify the point here. Consider a high school English class which is studying the short story. The objectives of studying the short story include development of literary judgment, knowledge of the elements of technique that constitute a good story, and enjoyment and appreciation of the purpose of the author in writing the story. The short story is examined on the path toward growth of the literate person. Obviously the purposes of some, even of most, authors include examination of problems of human value. Thus the English teacher is in an excellent position to assist in the process of value clarification generally and often in the elucidation of valuative issues of significance to environmental decision-making. "The English teacher with his unique, value-oriented subject matter can do more about values than almost any other teacher in the school." (13:129)

Consider, for example, the short story "The Japanese Quince" by John Galsworthy which is appended to this paper. It is very short, involves a quince tree as a central symbol, and raises questions about a lifestyle and the man-man and man-nature relationships involved in that lifestyle. It reveals a "value-orientation," as defined earlier in this paper, and provides, in addition to the opportunity to study plot and symbolism, the chance to ask questions about living and meaning that are pertinent to issues of modern lifestyle. Such issues, of course, lie at the core of environmental problems today. The students read the story which Kirschenbaum and Simon would regard as the "stimulator." The teacher discusses short story form and structure as illustrated in the story, then asks a series of directed questions which will ". . .help the student to clarify his thinking about the values problems raised by the stimulator." (13:122) Such questions might include the following:

1) Why does Mr. Nilson not go into the Square Gardens very often, even though they are a few steps from his door?

2) What does he miss for not doing so? Is this a significant sacrifice on his part?

3) Why couldn't Mr. Nilson enjoy the tree, the bird, the morning, and his neighbor's company?

4) Do you know personally anyone like Mr. Nilson?

5) Mr. Nilson doesn't know Mr. Tandram, and they've been neighbors for five years. Why is this so? Could this be so in your neighborhood today? If so, why so?

6) Do you think it important to know your neighbors, both trees, birds, and people?

From these questions the teacher might devise a number of discussion topics and composition assignments which will contribute to development of verbal skills while at the same time examining the values issues raised by the story. Each student might attempt to rewrite the story and set it in their world commenting on the same issues raised by Galsworthy but in a personal context. The opportunities for value study provided by this one story are many. It demonstrates that the teacher who is alert to opportunities to work with environmentally significant values issues in

the curriculum will find many opportunities to inject clarification activities into that curriculum without overtly and avowedly doing "environmental education."

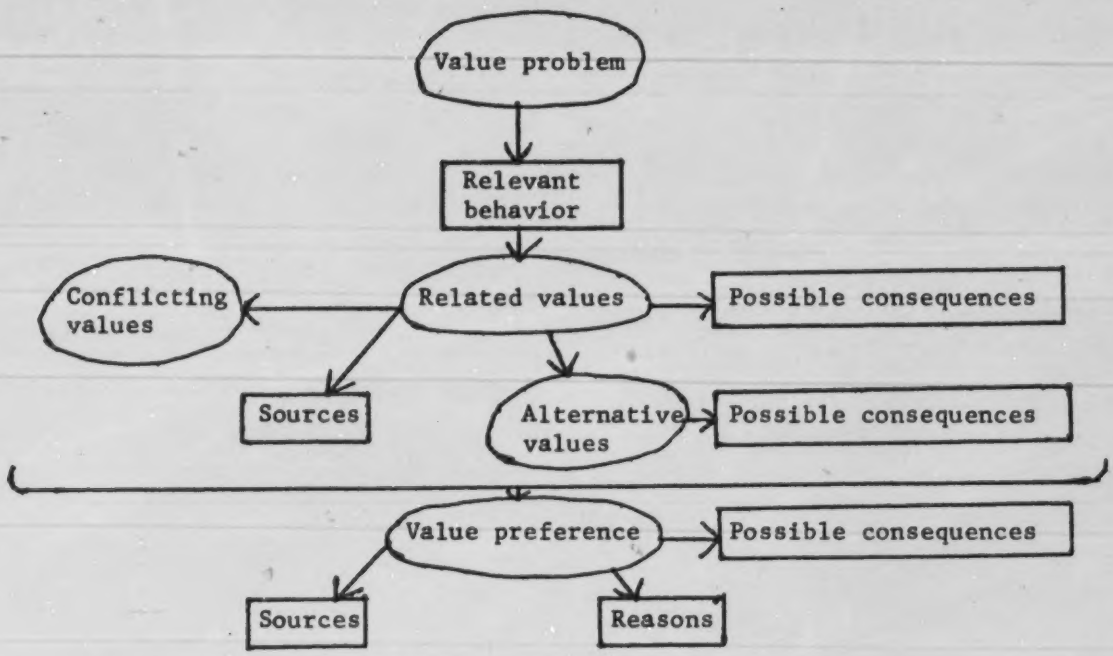
Similar examples of opportunity for examining environmentally related values through values clarification can easily be identified in social studies, history, science, home economics and other subject areas. Howard Kirschenbaum and Sidney Simon have compiled a collection of essays which indicate how these subjects can be explored for their values clarification potential. (13) The ideas presented are very basic but provide any teacher interested in such opportunities with a pool of ideas with which to begin. The essential task is to learn the theory and methodology of values clarification and become sufficiently familiar with the many published strategies so that opportunities for value study appear everywhere.

Banks Value Inquiry Model

Another way to examine values in environmental education, which complements and indeed utilizes values clarification, is the analytical approach. This approach has been developed principally in the social studies. James Banks has developed a strategy for examining values in social studies which will provide insight into the analytical approach and how it can serve environmental educators. (2) His "value inquiry model" involves several steps:

1. Defining and recognizing value problems: Observation-discrimination.
2. Describing value-relevant behavior: Description-discrimination.
3. Naming values exemplified by behavior described: Identification-description, hypothesizing.
4. Determining conflicting values in behavior described: Identification-analysis.
5. Hypothesizing about sources of values analyzed: Hypothesizing (citing data to support hypotheses).
6. Naming alternative values to those exemplified by behavior observed: Recalling.
7. Hypothesizing about the possible consequences of the values analyzed: Predicting, comparing, contrasting.
8. Declaring value preference: Choosing.
9. Stating reasons, sources, and possible consequences of value choice: Justifying, hypothesizing, predicting. (2:466)

Banks illustrates the operation of his model graphically in the following way:



Operations of Value Inquiry Model, Graphically Illustrated (2:467)

An environmental education application of this approach may be illustrated in an intermediate grade social studies class examining the use of natural resources. The teacher develops a case study which presents the conflicting uses being made and proposed for the Skagit River valley in northwest Washington State. These uses include recreation, fish production, and energy production, among others. Position statements from various conflicting interest groups are included in the case description, which the class reads. At step one (observation-discrimination) the students are asked to identify and describe the conflicts present in the situation. Next (description-discrimination), films depicting the different uses are presented, and students are asked to describe the conflict-related behaviors that they have observed, making as few inferences as possible as they do so.

Having done this, they next attempt to name the specific values illustrated by the behaviors in the films (identification-description, hypothesizing). This step is difficult and the teacher may need to present a list of values from which the students can select the appropriate ones. The next step is analytical and requires that the students identify specific value conflicts and associate them with the behaviors they have described. Thus the conflict between the values of the utility executive arguing for a nuclear plant with its economic benefits and the river preservationist arguing for protection of scenic and recreational values is clearly perceived.

The fifth step in the process (hypothesizing) inquires into the sources of the values observed in conflict in the situation. How did one person come to value the river in its natural state, and another come to see it as a physical process valuable primarily as a constant supply of reactor coolant? Students state their hypotheses and back them up as thoroughly as possible with reasons. Next, the students name all the value alternatives which they can possibly perceive in the situation. This takes them beyond the boundaries of the conflicts which they have examined and allows them to predict, compare and contrast the hypothetical consequences of different values. In this way they can hopefully perceive the resource management problem exemplified in the Skagit River case holistically and in the broadest perspective.

The next step is that in which the student is asked to declare a personal value preference. This is choosing, and is followed by the last step in the process in which the student supports and affirms his/her position. The student makes a decision, skill in the doing of which is one of the primary goals of values education. Banks and others note that it is essential that the teacher maintain a values neutral position throughout the process, only personally taking a position at the appropriate point in the process, and then fully accepting the positions taken by the students. To do otherwise would negate the value of the inquiry. "Unless the teacher creates a classroom atmosphere which will allow and encourage students to express their true beliefs, value inquiry will simply become a game in which students will try to guess what responses the teacher wants them to make." (2:465) There may be an awful temptation on the part of the teacher to be didactic about the "right" management of the Skagit River resource, but yielding to the temptation would not allow the student to learn valuing skills. Banks makes another good point which relates to the problem of value study as a means for change. He theorizes that

> "Once students are keenly aware of both the sources and consequences of their values, they are more likely to consider embracing other beliefs and to act on those which they hold. The child who discovers that his hatred for Jews is an irrational belief which he picked up from his parents may, after reflection, decide that he cannot both hate Jews and claim to value equality. To be rational, he must either change his attitudes toward Jews or accept bigotry as one of his values. It is not easy to change deeply ingrained attitudes and beliefs, however irrational they are. However, such beliefs will certainly not change unless the individual develops a commitment to change." (2:465-6)

Banks' approach to value inquiry, which includes values clarification, provides a good model for value study which addresses the three problems of value study which addresses the three problems of value discussed earlier in this paper. It can assist in resolution of confusion of values in the student. It can reveal the environmental consequences of behaviors associated with specific values. And it can lead to perception of the ecologically unrealistic nature of certain contemporary behaviors and the values

and value-orientation that underlie them. Then, if Rath, Harmin and Simon are correct in their assertion that ". . .human beings hold the possibility of being thoughtful and wise, and. . .the most appropriate values will come when persons use their intelligence freely and reflectively to define their relationships with each other and wish an ever-changing world," (27:39) the value-related problems are being approached in an effective manner.

Moral Reasoning Model

A third possible approach to the problem of studying values in environmental education is that based on the work of Lawrence Kohlberg. His search for understanding of moral development has resulted in a Typology. This Typology has three levels, and there are two stages within each level. He considers these levels and stages to be separate moral philosophies, ". . .distinct views of the socio-moral world." (13:50) They are progressive and people must move through the lower stages to the higher. A brief review of these levels and stages is necessary to explore how they may be utilized in environmental education.

Preconventional level - here the "well-behaved" child interprets good and bad in terms of their physical consequences (punishment or reward) or in terms of the physical power of those stating the rules. This level is usually occupied by children aged four to ten.

Stage 1. "Orientation toward punishment and unquestioning deference to superior power. The physical consequences of an action regardless of its human meaning or value determine its goodness or rightness." There is simple compliance to authority and no understanding of the reasons for the authority's behavior.

Stage 2. Right action is that which satisfies one's own needs in a physical way. Some satisfaction of other's needs comes in, but it is largely, as Kohlberg puts it, a "you scratch my back and I'll scratch yours" situation.

Conventional level - "Maintaining the expectations and rules of the individual's family, group or nation is perceived as valuable in its own right. There is concern not only with conforming to the individual's social order but in maintaining, supporting and justifying this order." The expectations of others are important determinants of "good" or "right."

Stage 3. "Good behavior is that which pleases or helps others and is approved by them." Children conform to other's definitions of what is "proper."

Stage 4. "orientation toward authority, fixed rules, and the maintenance of the social order. Right behavior consists of doing one's duty, showing respect for authority, and maintaining the given social order for its own sake." The "group" here is much wider than at the previous level, and following the rules established by the group to avoid chaos is often seen as an end in itself.

Postconventional level - This is characterized by "a major thrust toward autonomous moral principles which have validity and application apart from authority of the groups or persons who hold them and apart from the individual's identification with those persons or groups." Moral value resides in the individual who defines principles and commitments himself.

Stage 5. The person here understands how the rules of the society are made and applied. These rules are agreed upon by the society in order to regulate individual behavior so that the more ultimate principles and goals of the group can be pursued. Right action is defined in terms of general personal rights and in terms of socially approved principles, inherent in the social contract. Duty is defined in terms of that contract and the avoidance of violating other's rights.

Stage 6. "Orientation toward the decisions of conscience and toward self-chosen ethical principles appealing to logical comprehensiveness, universality, and consistency. . . . universal principles of justice, of the reciprocity and equality of human rights, and of respect for the dignity of human beings as individual persons." At this stage the person recognizes the importance of rules, regulations, and authority but views them only as means toward ultimate life goals. It may be necessary, in pursuit of these ultimate goals, to break rules and defy authority, and decisions to do so are entirely a matter of personal conscience. (14:132-4)

Kohlberg theorizes that moral growth occurs when people are presented with moral dilemmas requiring reasoning at the next highest stage. Rodney Allen describes the process; "Reasoning at the next higher stage creates discrepancies for the student, and, from these discrepancies between his view of moral and social reality and the new insights derived from the higher level reasoning, he or she learns to resolve the conflicts by moving to the next higher stage." (1:9) This, of course, suggests a specific methodology, which Kohlberg, Allen and others have explored.

This theory of moral development has several obvious implications for environmental education. One is that knowledge of the Typology should give teachers clearer understanding of their student's moral reasoning.

Allen notes that it is possible to hear statements of identifiable kinds which will indicate the stage of moral reasoning of the student and which demand a particular clarifying response from the teacher. The instructor can pose dilemmas at the appropriate stage that will stimulate growth toward the postconventional levels of moral reasoning that the difficult problems of environment require for their resolution. Teachers can also do a "reality" check" on their group and recognize the constraints and limitations of it. The frustration of posing a dilemma and expecting stage 6 reasoning from a group largely at stage 3 can thus be avoided.

Actual classroom applications of Kohlberg's ideas are difficult to locate in the literature. There are limited examples in moral education generally, and few, if any, in environmental education. Thus the field is open for exploration of the potential of Kohlberg's theory as a tool for environmental education. There follows a suggestion as to how Kohlberg's work might be useful to environmental educators.

A Dilemma:

There is trouble in the forests of northeast Oregon and southeast Washington. An eruption of the Douglas Fir Tussock moth (Orgyia pseudotsugata) is occurring in hundreds of thousands of acres of trees. Many people, particularly those working in the recreation and timber industries, fear that the insects, if left alone, will destroy the forests, costing thousands of people their jobs and their investments. They want the United States Forest Service to get to work immediately and spray the infected forest with DDT, a pesticide with a successful record in controlling the pest.

Many other people, on the other hand, are vehemently opposed to the spraying of this pesticide. They cite the overwhelming evidence of the hazards of this pesticide, evidence which has led several years previous to its use being prohibited in the United States. In their view, the hazards of contaminating the environment with DDT are greater than those of allowing the moth eruption to run its course.

Russell Train is the chief administrator of the EPA, the agency which enforces the DDT ban. If this pesticide is to be used, he will have to give the word. The pesticide will have to be applied at a specific period in the life cycle of the pest and time is short. Train finds himself under particular pressure from both sides. The pressure to lift the ban and apply the pesticide is especially strong because it is a period of recession and unemployment and destruction of these forests, so the argument goes, will contribute to this uncomfortable economic and political situation.

What should Mr. Train do?

The reasons stated below are among those that students might use to justify their view on what Mr. Train should do. They have been classified according to Kohlberg's stages of moral development.

Mr. Train should approve the use of DDT	Mr. Train should not approve the use of DDT
1. Everyone should accept decisions made by the Administrator of the EPA.	1. Everyone should accept decisions made by the Administrator of the EPA.
2. I don't want jobs to be lost because the economy will be affected and even if I don't lose my job the cost of wood products is bound to go up and my cost of living will rise.	2. The DDT will probably affect the reproduction of falcons and there won't be any when I go there to see them.
3. Business and industry supports the use of DDT and Mr. Train will be very unpopular with this group if he does not allow the pest control program to begin.	3. Mr. Train will be very unpopular with environmentalists if he approves the use of DDT.
4. It is Mr. Train's duty to do what he can to preserve the economy even as he maintains the environment.	4. It is Mr. Train's duty to protect the environment, acting on the basis of the best information available.
5. The government has a moral responsibility to provide for the welfare of the nation's people. It must protect their means of making a living. In this case, the resource base of the tourism and forest product industries must be protected and sustained.	5. The government has a moral responsibility to maintain a quality environment. This responsibility extends to prohibition of the use of substances which have demonstrated negative effects on that quality.
6. He must allow the use of the pesticide because in this case the benefits outweigh the costs.	6. As a matter of conscience the permission to spray must be withheld, despite political pressure and public opinion. As a public servant Mr. Train must follow the path which he believes is right, irrespective of any external pressures.

This example is intended only to illustrate the potential of the moral reasoning approach to value study. Obviously a great amount of information must be provided the student who is trying to resolve the dilemma. The teacher may present a series of such dilemmas and the student's consistent

response in a number of trials will indicate where she is in relation to her moral development. New dilemmas could then be structured which will present the student with a genuine cognitive conflict which can only be resolved by moving to a higher level of moral reasoning. This approach allows the environmental educator to recognize the relationship between fact and value judgment. Presentation of the facts about pesticide use is necessary but not sufficient for achievement of the action goal of environmental education. The student in reality must learn to perceive alternatives that arise from the knowledge and choose from among them. Moral development is growth in ability to perceive alternatives, evaluate them, and decide. This example can only hint at the potential of Kohlberg's ideas for environmental education. Exploration of the potential presents a real challenge for research and development in environmental education.

Conclusion

Obviously a great deal more can and will be written about the problem of values education in environmental education. The purpose here has been to briefly review the problem of value as it relates to the environment in general and environmental education in particular, and to suggest several possible ways that value study in environmental education might be carried out. Three approaches have been described: values clarification, the use of analytical models, and the moral development model. The three are not exclusive of each other, as values clarification can and does contribute to the other approaches. Values clarification is based on a straightforward theory of valuing, is a rapidly developing methodology, but is not the answer to the problems of valuing reviewed here. It is a valuable tool but seems most effective in environmental education when incorporated into a process of resolving a moral dilemma, as in the case of the other two strategies.

The next step beyond this discussion for environmental educators is preparation, implementation, and evaluation of environmental education materials utilizing the above-mentioned approaches. The literature review involved in this study indicates that much work of importance to environmental education is being done in the fields of social studies education, moral education, and humanistic education. As environmental educators increasingly agree that they must focus on values, extensive cooperation with people in these fields will be necessary and productive.

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LAND USE DECISION MAKING: A COMMUNITY ISSUE

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The recently completed instructional package entitled THE LAND USE DECISION MAKING KIT (L.U.K.) has been used by community organizations in educating local citizens to the natural resource issues involved in land use conflicts. The Kit is a set of sixteen self-instructional audio-tutorial units on land use decision making. This innovative approach has allowed individual community members to study land use issues on their own time, at their own pace and in their own home. The program has been used by both adults and students concerned with the same issues. The subsequent benefits were an increase in community communications. We report on the use of the L.U.K. in five communities. The results of the community evaluation are included. Land use issues that the instructional materials have been applied to are: lake front development, watershed development, flood plain issues and park development.

INTRODUCTION

This paper is the second in a series. Previously we have reported on the development of individualized self-instruction materials in land use decision making. This paper is concerned with their use. The materials have been completed and the entire collection has been named the Land Use Decision Making Kit (L.U.K). One copy of the entire kit has been distributed to each town in Connecticut which has expressed an interest in the Kit. The L.U.K.'s have been in use for five months. While it is still too early for a full evaluation of the project, early indications have been promising. Feedback in the form of five anecdotal reports, is presented in following sections of this paper.

THE LAND USE DECISION MAKING KIT (L.U.K.)

A basic objective of the L.U.K. Project was to expose members of a community to educational materials concerning the general concepts of land use decision making. Specifically, the materials were designed for interested individuals, community agencies and secondary schools. The materials were to incorporate a flexible instructional format to accommodate the diverse needs, background and time schedule of individuals who would be making use of the kit. To meet these diverse needs, the material was designed in an individualized audio-tutorial (cassette tape-slides and/or guide sheets) format.

There are sixteen units in the L.U.K. Figure 1 presents a graphic representation of the titles of the units as well as their organizational relationships. The base of the pyramid includes basic land use planning skills. The second through fifth layers are the systems of importance in planning. The implementation units represent the normative system for the planning process. Finally, the synthesis units integrate information into one format for decision making.

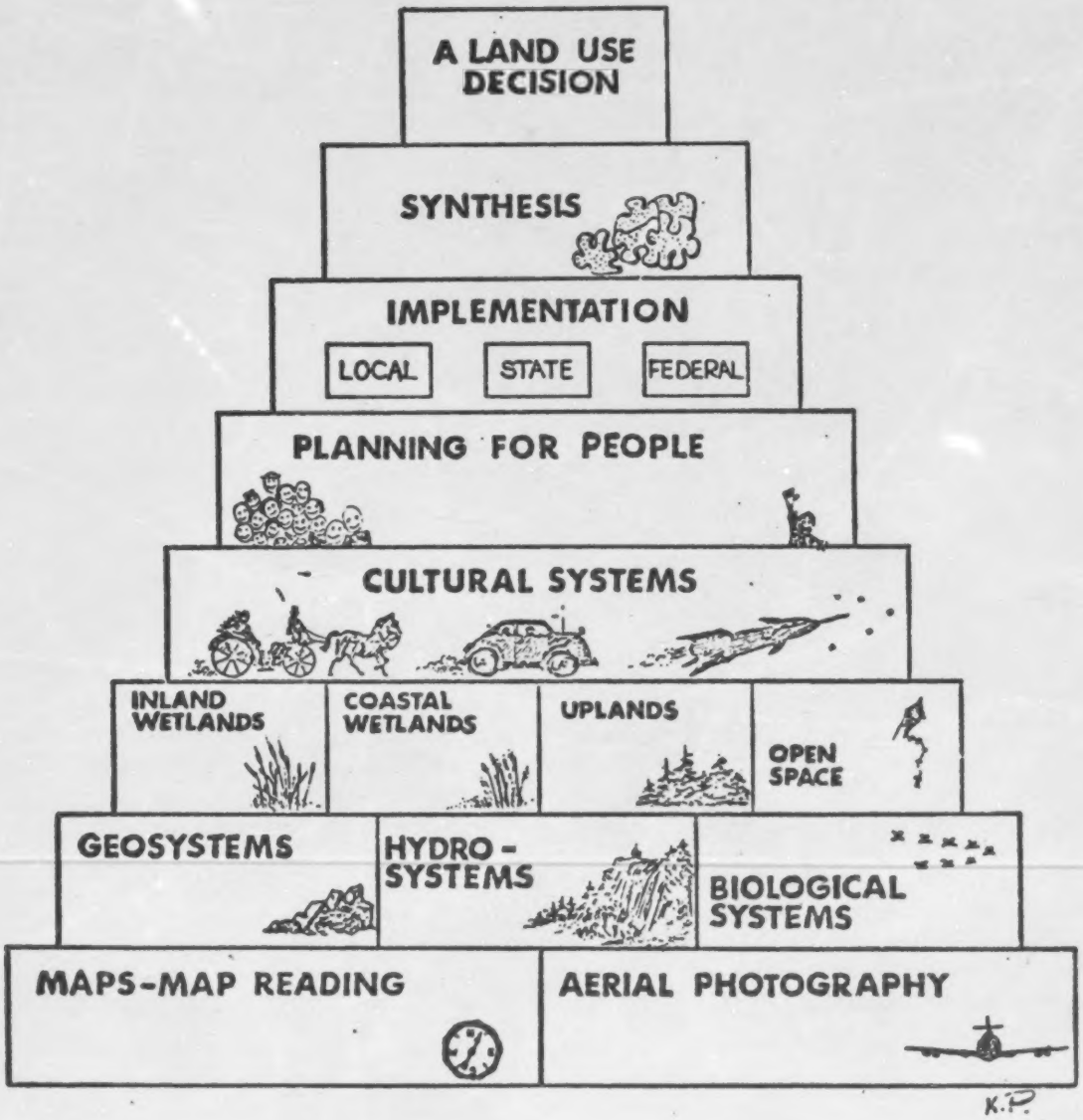
In designing the instructional format it was necessary to use a basic structure which would establish a continuity and also serve to integrate the 16 units. As a starting point, each unit includes (1) an audio-tutorial tape, (2) a set of guide sheets, (3) a glossary of terms and (4) an annotated bibliography. Supplemental materials including slides, aerial photos, maps, booklets and bulletins have been included where appropriate.

Each unit begins with a statement of behavioral objectives and a list of special instructions. The behavioral objectives briefly outline the skills and concepts which are to be mastered as the participant proceeds through the unit. They also serve as a self-check which may be referred to upon completion of the unit.

The audio-tutorial tape presents the basic instructional information on the study topic. Guide sheets, 34mm slides and other materials are integrated into the taped instructional flow. They function together to provide (1) visual reinforcement of audio flow concepts; (2) active user participation in problem solving or simulated land use decision making activities; (3) materials best presented in written form; and (4) a summary of the major concepts presented in the unit. This method of learning provides the participant with an individualized and self-paced learning process.

Figure 1.

LAND USE DECISION MAKING KIT



Providing a system for assessing and including the information in the L.U.K. presented a challenge. Ultimately, two matrices were developed which permit the L.U.K. user to determine the types of information found in a specific unit or to define an issue or area of interest. Having defined an issue, the matrix helps the user select units that treat that subject. Figure 2 presents one matrix indicating the correlations between land use decision making issues, and the units of the L.U.K.

By entering the matrix from the left margin, the participant can identify units that are primary or secondary sources of information on specific issues. By entering the matrix from the top, an analysis can be made of the primary and secondary topics considered in the unit.

DISTRIBUTION

The L.U.K. was distributed to interested towns in a series of seven workshops held around the state. One hundred and thirty of the one hundred and sixty-nine towns in the state elected to attend one workshop and receive their Kit. In addition, nine state agencies requested and received the L.U.K. The only condition attached to the free distribution was that the "Kit" be located in a point of public access (i.e., town hall, town library, or school library). In addition to a "guided tour" of the different units in the L.U.K., various options for utilization of material were explained. Special emphasis was given to identifying points in the units where information could be localized for an individual town. In the MAPS and MAP READING unit we suggested the addition of town maps.

Town soils and geology maps, aerial photographs and inland wetland regulations would be appropriate for the Inland Wetland Unit. A recommendation was made that one copy of the local town plan, open space plan, zoning map and regulations, as well as other reports on the area produced by Regional Planning Agencies or State Agencies be added to the L.U.K. In this manner, each town would have a Kit customized for their locality. It should be noted that careful planning and inclusion of local and state supplemental material will serve to customize the L.U.K. for the needs of communities throughout the United States.

In order for towns to exchange information on uses of the L.U.K. and other related experiences, we have maintained an information exchange in the form of a newsletter. The case studies reported in this paper are selected from entries submitted by towns. The names of respondents and their towns have not been included by the request of these individuals.

PARK DEVELOPMENT

In designing the L.U.K. an effort was made to produce a set of materials that could be used by students as well as other members of the community. This format was intended to focus the attention of students on issues upon which their parents and other community decision makers would be working.

One demonstration of the capability of the L.U.K. to fulfill this role involved a group of college students and a shoreline community. The students were enrolled in an environmental studies course in which the basic instructional program was built around units in the L.U.K. When the students had completed the majority of units in the Kit, they were given an assignment which required them to identify a local land use decision making problem and to develop a plan for the area using concepts and skills developed throughout the course.

Figure 2.

GUIDE SHEET # 16

A MATRIX CORRELATING LAND USE ISSUES WITH UNITS OF THE LAND USE DECISION MAKING KIT.

P=Primary source of information
S=Secondary source of information

		INTRODUCTION	MAPS-MAP READING	AERIAL PHOTOGRAPHY	COASTAL WETLANDS	INLAND WETLANDS	OPEN SPACE	UPLANDS	GEOSYSTEMS	HYDROSYSTEMS	CULTURAL SYSTEMS	SYNTHESIS - BUILDABILITY	SYNTHESIS - ATTRACTIVENESS	LOCAL IMPLEMENTATION	STATE AND FEDERAL IMPLEMENTATION	ECONOMICS OF LAND USE	PLANNING FOR PEOPLE
Significance of Selected Land Uses	OPEN SPACE		S		P	P	P	P					S			S	S
	WATERSHED		S		S	P	S	P		P							
	COASTAL WETLANDS		S		P		S			S					S		
	INLAND WETLANDS		S			P	S		P	P				S	S		
	FLOOD PLAIN		S							P		P		P	P		
	AGRICULTURAL LAND			S			P	P		S						S	
	NATURAL AREAS				P	P	P	P				S					
	FORESTS		S	S		S		P		S							
Impacts of Land Use	RECREATIONAL SITE						P		S	S			S		S		S
	ENVIRONMENTAL IMPACTS				P	P		P	P	P		P	S				
	FLOOD PLAIN ZONING	S								P		S		P	S		
	ZONING PROCESS	S				S	S			S				P			
	POPULATION GROWTH	S			S	-	S				S						P
	ENERGY USAGE										P		S				
	TRANSPORTATION		S	S	S						P		S				
	POLLUTION				P	P		P				S	S		P		
	HOUSING			S	S	S			S		P	S	P			P	
Cost Benefit Analysis of Land Use	COMMERCIAL DEVELOPMENT												P			P	
	RESIDENTIAL DEVELOPMENT				S	S							P			P	
	INDUSTRIAL DEVELOPMENT				S	S							P			P	
	CLUSTER DEVELOPMENT						S						P	P		P	
	LAND VALUES						S	S					P			P	
Determinant Systems in Land Use	PROPERTY RIGHTS				S	S	S							S	P	P	
	SOILS	S				P			P			S					
	GEOLOGY	S							P			S					
	HYDROLOGY	S			S	S			S	P		S					
	BIOLOGICAL				P	P		P				S					
	CULTURAL	P					S				P						P
	POPULATIONS	S		S	S								S				P
	ECONOMICS	S			S	S							P			P	

Information on the site, maps and other data were assembled using the Citizen's Guide to L.U.K. and by contacting officials identified through activities in the Local Implementation Unit. The site in question was in the coastal zone and was being considered for potential development. A great deal of excitement had been generated by a local environmental group which was attempting to stop development of the site. A project that would have gone on unnoticed a few years ago had become a highly publicized political football.

In assessing the alternative proposal for the forty-five acre coastal site, the student study group determined that the economic and political powerhouses of the community would not permit the area to be "preserved." It seemed possible that by using an "all or nothing" approach, the environmental group might end up with nothing and the entire forty-five acres would be turned over to developers.

In light of the harsh reality of the situation, the students developed a plan that will permit the development of light industry and a senior citizen's living center on one half of the site and will place a city park on the remaining parcel. In developing the plan, students used information from several units to determine where building should take place, and where various facilities for the park would be located. Economic costs of development were worked out, along with the economic benefits to be gained from taxes produced by the developed area. In addition, the economic benefits of the recreational availability of land for the community were spelled out.

A finalized report and map were produced by the students and they have been discussed with community planners and the environmental group. It appears as if the final site plan implemented by the community will be a modified form of the plan developed by the student project team. Student-community interaction did take place to the benefit of all the involved parties. In fact, members of community boards, the environmental group and the students all made use of units from the L.U.K. to gather information and develop skills in land use decision making.

WATERSHED DEVELOPMENT

The motivations for using the L.U.K. vary among the towns. In a rural town with a small population, the motivation was a need for communication among six regulatory bodies, each with some control over land use. Historically, several of the agencies had given little consideration to the role of natural resource data in planning. The issue that triggered their interest in more objective planning was a proposed large subdivision. Considerable controversy had surfaced over the developer's soil report. The Conservation and Inland Wetland Commissions had taken issue with the conclusions of a consultant hired by the developer.

At the invitation of an Inland Wetlands Commission member, a meeting of all six regulatory bodies was held. In advance, the Commission provided copies of the Geosystem Unit from the L.U.K. for each member. That evening, in small groups, the combined membership of the agencies spent two and a half hours reviewing the instructional materials. The last hour was spent in discussing the subdivision proposal before the Zoning Commission. At the end of the meeting, the combined membership agreed that the soils data in the consultant's report was probably correct but the interpretation was certainly not. It was determined that the slopes on the site were in excess of 15%, much more than the report indicated.

The united approach to the evaluation of a single subdivision was of great value, but more important is the fact that the members of the six regulatory agencies began a dialogue which they maintain today. A direct outcome of the meeting was an increased awareness of the need for natural resource data as part of the decision making process. More specifically, they identified specific soils and geology information which each agency would require on applications. Based on the successful completion of the case studies in the unit, the individuals attending had an ability to use the soil survey, soil keys, and the surficial geology maps. The local soil scientist, as a result of the controversy over the subdivision, conducted a "buyer beware" program to inform landowners and potential homeowners of the information that can be obtained from the soil survey.

Another outcome relates to the regulation of inland wetlands, a new phenomenom in Connecticut. To increase citizen awareness of the regulatory program, the Inland Wetland Commissioners used the Inland Wetland Unit as the focus of a series of a public program on the structure and function of Inland Wetlands.

FLOOD PLAIN ISSUES

Flooding is a perennial problem. Since the National Flood Insurance Program was implemented, many towns have adopted flood plain regulations in order for community members to qualify for subsidized flood insurance. In a coastal town between New Haven and Bridgeport, regulations were adopted and insurance issued. However, the town has elected not to enforce the regulations in order to encourage development. The Conservation Officer has tried to testify on individual cases to indicate the violations of the town's flood plain regulations. His efforts have been ignored by town officials. The Conservation Officer is a CETA employee who has limited his political effectiveness since the position is not a budgeted one.

After receiving the L.U.K., the Conservation Officer changed his strategy. Based on the Hydrology Unit, the Local Implementation Unit, and the Federal Implementation Unit, he conducted a series of public information meetings after the heavy rains in late winter and early spring. The presentation included a summary of flood plain identification techniques, flood plain functions, flood plain zoning, flood proofing, and flood insurance programs. In addition to using scripts, slides, and guide sheets from the L.U.K., the Conservation Officer supplemented the presentation with slides of flooding in new subdivisions and excerpts from the town's flood plain regulations. The presentations have led to a series of articles in the town paper. Presently, the community has gained a great deal of new information on flood plains, flood plain zoning and flood insurance. Community education is taking place!

LAKE FRONT DEVELOPMENT

With the development of fresh water recreation and second home developments in Connecticut, there has been considerable pressure on local planning and zoning agencies where most of the state's lakes are located. Communities have faced problems with eutrophication of lakes, failing septic tank systems, loss of farmland, water pollution, erosion and sedimentation, and loss of aquifers among many other issues. The area has a small population, and small tax base. Consequently,

the availability of professional staff is severely limited by available funds. Community members who serve on regulatory agencies spend many hours as volunteers in town government. In the past, they have often been overwhelmed by professional presentations of developers' consultants.

After learning of the free distribution program of the L.U.K., the area's Regional Planning Agency took a leading role in obtaining Kits for their 9 towns. The staff planner visited each town to discuss the use of the Kit. At the introductory meeting the problems the town faced, as well as the goals and objectives of the training sessions, were discussed. Most towns agreed to do two units each month.

The planner visited each town at the end of a month and led a discussion of the units completed. By using the units as a common information base, the planner was able to take maximum advantage of the two hours he had each month to train each commission. In his words, "with each member completing the unit before the session, and two hours together, we were able to cover material that would have taken us normally 8 to 10 hours of meeting time. We cannot be sure if the end result will be better decision making, but we are confident decisions will be based on a better information base."

SIMULATION EXPERIENCE

In a suburb of New Haven, the L.U.K. went to the town high school rather than the local government. The L.U.K. is made available to members of the community through the school and is used in the school Environmental Studies course. The teacher selects a different site in their town each semester and proposes four alternative uses for the parcel. The class is divided into five planning teams. Each team evaluates the site and makes an optimal use decision based on the information they collect. The 16 units of the L.U.K. are available in an independent learning center. The index matrices are posted to allow students to select units based on their needs.

In order to analyze and interpret data sheets provided on the site, students assess individual units in the library. Half way through the project, a public hearing is held to explore factors students may have overlooked in the planning process. The climax of the program is a hearing before a panel composed of representatives from the town's zoning commission, conservation commission and inland wetlands agency. Evaluation of class projects have indicated a substantial retention of cognitive information from the L.U.K.

CONCLUSION

Assessment of the effectiveness of the L.U.K. has been conducted in two dimensions. One focuses on the attitudinal objectives initially defined for the project, and the second focuses on cognate objectives.

Relative to attitudinal change, the L.U.K. was designed to:

1. Sensitize participants to the importance of sound land use planning as a component of environmental decision making.

2. Facilitate attitudinal changes toward land use planning and environmental problems.

3. Emphasize the interdisciplinary nature of land use issues.

4. Develop positive attitudes toward problem-solving as it relates to land use decision making.

Correspondence from decision makers and personal interviews indicate that the L.U.K. has had a substantial impact on the way in which land use decision making is viewed by people who have completed units from the Kit. The anecdotal reports presented here are representative of the kinds of unsolicited responses which have been obtained from communities using the L.U.K.

The L.U.K. has proved to be extremely effective in assisting participants in achieving the cognitive goals established for each of the units. Cognitive goals for each unit are listed on a guide sheet at the beginning of the unit. At the conclusion of the unit, the participant is asked to re-read the objectives and determine if in fact they have mastered the objectives. Personal interviews, letters from L.U.K. users and exams utilized in the high school and college population using the material, show a high level of instructional effectiveness.

In summary, the L.U.K. has improved the cognitive base upon which land use decisions are being made by communities. It has changed the attitudes of people toward the planning process, and people have enjoyed using the material. The L.U.K. is not a final step in community education in land use decision making, but it is a good solid first step.

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NOTE: For further information about the Land Use Decision Making Kit (L.U.K.) write E-P Education Services, 21 Merritt Street, Hamden, Ct. 06511.

THE CHANGING ROLE OF MASS COMMUNICATION IN ENVIRONMENTAL EDUCATION

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Conservation and communication in America have been for many years symbiotic, and continue to be so.

As a prelude to discussing the changing role of mass communication in environmental education today, it is well to look at some past communicators who played key roles in the rise of the land ethic.

Beginning so early as 1833, William Henry Herbert "invented" outdoor writing. Under the pen name of Frank Forester, in voluminous articles and books he extolled the gentlemanly virtue and the conservation necessity of sportsmanlike conduct in hunting and fishing. His code was later to become institutionalized in the Boone and Crockett Club, and his standards of literary quality were adopted by succeeding practitioners of the genre like Havilah Babcock, Harold Titus, Archibald Rutledge, and Gordon MacQuarrie.

The Woodward and Bernstein of the 1885-1900 conservation movement were George Bird Grinnell and Emerson Hough, Grinnell as editor and publisher of Forest and Stream, a high-class New York weekly, and Hough as his prize investigative reporter. Through a long series of editorials and exposés, they could rightfully take much credit for pioneer state and federal legislation affecting national parks, national forests, and wildlife. Grinnell became a founding member of the Boone and Crockett Club, and the founder of the Audubon Society of New York, the forerunner of the National Audubon Society. Forest and Stream has many worthy descendants today, as does Emerson Hough--Michael Frome, for example.

At the turn of the century, Robert Underwood Johnson took up the cudgel for park preservation through the columns of his Century Illustrated Magazine. With a circulation that reached 200,000, and a reputation as not only the best printed magazine in the world, but as the conscience of the country, Century was sort of a combination of Time, Life, Harper's, and New Republic. So when Johnson turned over many pages to a California essayist, the Yosemite story had a powerful impact. The writer: John Muir.

In 1887, joining the staff of the New York Sun were two young cub reporters who were to have a profound effect on the course of conservation. One was Stephen Mather from California, the other Robert Sterling Yard from New York. Mather left the Sun in 1893 to handle advertising and marketing for a new washing and bleaching powder which he billed as "Twenty Mule Team Borax." Twenty years later he retired a millionaire. Publicly critical of the mismanagement of the embryo national parks, he was challenged by his college classmate, Franklin K. Lane, Secretary of Interior, to come to Washington and "run them yourself." With his own money, Mather hired his old buddy, Yard, to leave newspapering and head up promotion for what was to become

the National Park Service. Together Yard and Mather met with the New York Sun Alumni Association in 1915 and sold their former colleagues throughout the country on publicizing park preservation. Yard prepared the official "position paper," a handsome National Parks Portfolio, subsidized by the Association of American Railroads. In 1919 Yard left the Park Service proper to become executive secretary of Mather's "front organization," the National Parks Association, and later served the Wilderness Society in the same role. Mather retired in 1928. Their rapport with journalism and journalists was a priceless attribute in building public support for conservation.

Howard Zahniser introduced radio and conservation to each other. From 1931 to 1942 he served the Bureau of Biological Survey and its successor agency the U. S. Fish and Wildlife Service as editor, writer, and broadcaster on wildlife research, administration, and conservation. In 1945 he joined the Wilderness Society as executive secretary and editor of its journal, The Living Wilderness. He was the father of the Wilderness Act of 1964, which he was largely instrumental in writing and seeing through to enactment. As a pioneer in conservation radio, of course, Zahniser had a master colleague--FDR and his fireside chats on CCC, SCS, and TVA. Their heirs are such avuncular tones as those of Cronkite, Newman, Mudd, Reasoner, Godfrey, Smith, and Walters on the TV news.

The Plow that Broke the Plains, a New Deal film documentary in defense of soil conservation, was indeed a landmark. But more than any other single man perhaps, Ansel Adams has married conservation to the camera. Essentially a freelancer photographer, his monumental 1955 photomural collection, This is the American Earth, has stirred hearts and minds to awareness, interest, and action, and kept the Sierra Club solvent.

In 1962 a rather small paperback hit the bookstands of America will all the impact of a blockbuster, authored by a former U. S. Fish and Wildlife Service spinster editor/biologist. Quietly and calmly she ripped the lid off the massive use of chemical pesticides. Rachel Louise Carson's Silent Spring probably did more to arouse the American people to the critical needs of their environment than any form of mass communication before or since.

So much for this fox-chase through conservation communication history. We have hit only a few representative high-spots. What of today?

The environmental communication ecosystem is now characterized by at least five distinct trends:

The dispersed agenda-setting role of specialized periodicals and paperbacks, the impact of NEPA's requirement for 102 statements on the quality and quantity of enviornmental news coverage in the press, the emergence of a new breed of environmental reporter, the employment of institutional advertising on the part of industry to impart "backlash" messages, and the pivotal role to be played by organized labor.

Agenda-setting is that function in which media take a lead in placing before the public an emerging issue or a changing slant on an old issue, rather than in merely reporting or "covering" issues and actions already clearly in the public ken. Typically this function is performed initially by specialized periodicals aimed at particular "innovative" audiences. Most if not all intellectual movements or political positions in this country have had their parameters sketched and their doctrines cemented in such fashion before they enter the arena of the mass media.

It was so with the environmental movement. Veteran conservation journals like Audubon and the Sierra Club Bulletin, both dating from the 1890's, were sounding various strains of the tocsin early on. Beginning in 1958 they were joined by a rash of custom publications with the magic words "environment" or "environmental" in their titles. Not until late 1969 did major magazines, newspapers, and TV discover the emerging environmental agenda.

Today, however, some environmental periodicals have faded from the scene and those remaining are hard-pressed to stay ahead of the New York Times, Newsweek, CBS, and the like in surfacing environmental rationales and issues. A reader of the Lewiston, Idaho, Morning Tribune is as apt to be called to attention by an editorial on strip-mining as is a follower of Washington, D. C.'s Environmental Action newsletter. In short, in terms of environmental affairs, the agenda-setting role of the media has become broadly diffused, to the end that environmental education everywhere has a highly-visible data base for discussion.

Perhaps nothing has so changed the face of environmental coverage in the mass media as has the requirement of the National Environmental Policy Act for the development of environmental impact statements on federally-funded projects, accompanied by related requirements in many states. The "102" statements have automatically provided two basic "news" ingredients--they are events that are happening now, and they have a high component of conflict. So they have become grist for the media mills. When they have prompted court suits and counter-suits, they have doubled and quadrupled both the quantity and the quality of media coverage.

Before NEPA, the environmental reporter was like a sports writer restricted largely to "think pieces" because there were very few "games" actually to cover. With NEPA, the environmental reporter has a vastly escalated number of points of entry to his running story on environmental issues and actions. It is unlikely that any other single Federal act has had such an inadvertent yet nonetheless profound impact on the flow of news on a particular aspect of public affairs.

Within the organizational framework of the media themselves, NEPA has had a related impact. Whereas yesterday the conservation/environment story was largely the domain of agricultural, outdoor, science, or urban specialists, depending upon the slant, today the environmental story is popping up on everybody's beat. Capitol, court, courthouse, city hall, education, business, women's page, finance, health--you name it, and almost any beat is apt to surface a story with an environmental aspect. As a result every reporter has had to become conversant with issues and answers. In the meantime we have also seen emerge on the larger dailies, magazines, and networks a sophisticated environmental specialist who makes no attempt to cover the breaking news of the day, whatever its source, but who concentrates rather on in-depth interpretive or investigative reporting.

Recent research suggests this new breed of environmental reporter shares no common background nor even a common definition of what constitutes environmental news. Whatever their training and whatever their perceptions, they do share a professional commitment to try to elucidate the economic, ecological, esthetic, and engineering aspects of the complicated subject they are covering. Their contribution to environmental education is significant.

In the presence of relatively objective environmental specialists in the media, it is increasingly difficult today for either side of an environmental issue to dominate news columns or air time. Environmentalists, being a relatively impecunious lot,

have had to expend their limited resources largely on rifle-type communications to selected public-opinion molders. Business and industry, on the other hand, have no such fiscal problems. The result is a mounting employment of shotgun institutional advertising in newspapers and magazines and on television to impart a "backlash" message. Some of this advertising is relatively soft-sell; some has all of the finesse of a meat-axe. Whether any of it changes any hearts or minds we have no Nielsen ratings to indicate. We do have at least one case of a one-time environmental periodical keeping itself afloat only by selling out to oil and power company full-color ads--and related mealy-mouthed feature articles.

In the final battle of Armageddon between economics and ecology, organized labor may well hold the ultimate weapon. If the AFL-CIO and its sister unions were to negotiate for a sanative environment as well as for wage and job security the shot could well be heard around the world. To date, the rhetorical posture of the AFL-CIO headquarters is impeccable. Leading labor men and their money have played key roles in environmental education. At the local level, however, the story is something else again, with unions fronting for nuclear power plants and opposing bottle bills, for example. So long as the most endangered species in America is the Detroit auto worker, labor's position on environmental issues will be as excruciating to develop as it is pivotal to any kind of social and scientific entente on environmental affairs. More than in laboratories or legislatures, the next chapter in environmental communication will be written in union halls. Environmental education will reflect the results.

In summary, through the long course of history in this country, mass communication has been a handmaiden of environmental education. Today, perhaps more than ever before, the environmental educator at all echelons can draw on the mass media for insight and even inspiration. In turn, the environmental educator is charged with nurturing the environmental communicators of tomorrow.

ENERGY CONSERVATION

A VALUE ORIENTATION FOR RESOLVING THE ENERGY-ENVIRONMENT CONFLICT IN THE THIRD CENTURY

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Predicting the future partakes of both science and prophecy. The prophetic element draws man to the enterprise; the scientific aspect reveals its limitations, and thus restores man's freedom and responsibility for his own fate.

The prophetic element is a siren which lures man by singing of safety in the unknown waters of tomorrow, by promising orderly progress amidst the rocks of accident and the shoals of stagnation, and by reassuring man against secret doubts of his own capacity. It was to eliminate these psychological fears that our ancestors consulted the entrails of birds. Our modern augurs reveal the predestined future to equally credulous audiences after reading the entrails of computers.

In contrast, the scientific element of future-prediction has a more limited validity: not to foresee the future, but to sharpen our awareness of what surrounds us in the present. To future-prediction in this sense, this essay addresses itself: to outlining the possibilities latent in America's third century, to choosing those aspects of scientific and technological development most consistent with the traditions and spirit of America, and to indicating the specific policy choices which will be necessary to achieve the kind of society we wish to become.

The main assumption on which modern attempts to foretell the future are based is the principle of continuity; namely, that past, present, and future are casually, rather than merely chronologically, related; and that, therefore, it is possible to foresee what is to be by simply extending ongoing processes or trends. Of course, the future we extrapolate will depend on how well we identify the central variables governing past and present. For example, the sixties were basically optimistic; they extrapolated futures involving continuing scientific and technological progress; increasing affluence, urbanization, and literacy; worldwide industrialization; the spread of democracy, freedom, and rational organization; in short -- the world transformed into Henry Luce's vision of "the American century". The seventies, born in a more gloomy social climate, if not an outright "loss of nerve" in western civilization, have seen radically different projections. The central variables have been identified as the deteriorating environment, the depletion of basically non-renewable resources, uncontrolled population growth, widespread malnutrition, and rapid industrialization in both developed and underdeveloped societies. Extrapolating these trends into the future has yielded the despairing vision of an overpopulated, overexploited, and overconsuming planet -- of societies whose fate can only be social breakdown, collective selfishness, and, ultimately, authoritarian domination.

Which of these divergent models represent America's third century? In matching his assessment against the sophisticated mathematical projections of the Hudson Institute or the Club of Rome, the intelligent citizen must affirm three truths which computer projections always overlook. First, trends are not immutable. Second, as Robert Nisbet argues, the most crucial changes in human history have

been more associated with "unpredictable" factors -- such as the chance event, or the unexpected influence of a prophet, a genius, or a fanatical madman -- than with the gradual accumulation of minute changes into major qualitative transformations of social existence. This is the real reason behind Hegel's lament that the only thing mankind learns from history is that mankind never learns from history. Third, we cannot escape from the unpredictable single event into the false security of "the wave of the future". The way out of the dilemma is not prophetic solace at the breast of the computer. Rather, it lies in becoming conscious that the one greatest unpredictable determinant of all is, simply, our freedom to choose among the alternatives which our knowledge reveals to us. Freedom is the dialectical synthesis of chaos and determinism; choice based on awareness of real options is the only key to America's third century. Neither utopian dreams, nor abandonment of our critical faculties before the computer print-out, can replace the real tasks: assessing our possibilities, formulating our priorities, and making the specific necessary decisions to achieve our objectives.

For some time now, science and technology have been unacknowledged legislators of our civilization. They have shaped American beliefs and values much as poetry and religious inspiration shaped the emotions of men in previous societies. Did anyone deliberately transform the innocence of Jeffersonian America into the complex urban civilization of today? No. It was largely unanticipated and unplanned. For example, the automobile separated work from home; it created suburbanites and mobile teenagers who repudiated Henry Ford's homely virtues while accepting his technological generosity. More recently, science and technology have shaken the bastions of sexual morality and the family institution more than the greatest social revolutionaries of the past. In short, while accepting the material comforts of science and technology, modern man also expects these institutions to answer his deepest questions about the nature of life, the meaning of the cosmos, and the future of society.

In the next century, we must transform these unacknowledged legislators into deliberate instruments for constructing the future we want. This is not a matter of gimmicks or techniques, of special tricks of the scientist-magician for simplifying decisions. What science does possess is an ethos of discovery and verification; to this must be added what the scientific community has hitherto signally lacked and what America's democratic tradition can provide; namely, a sense of civic responsibility in the broadest sense. What American democracy possesses is an ethos of individual dignity and collective policy-making; to this must be added an education which inculcates the citizen with the virtues of the scientist in the broadest sense; namely, a respect for truth and evidence. The primary task, then, is one involving the education of both the scientist and of the democratic citizen.

Clearly, to reject science today with the anti-rationalist contempt of our romantic rebels is but to march blindly into slavery. But to recognize the potential dangers to American democracy in the emerging scientific-technological elite and the military-industrial complex was no act of romantic rebellion, but a sign of the statesman-like vision of a respected President. The dangers are real enough. The delusion is to believe that they can be eliminated by minor institutional tinkering such as the creation of non-scientific ombudsmen or oversight committees composed of concerned laymen. Such tinkering leaves unanswered the perennial question posed by Plato, "Who shall guard the guardians?". If science and technology are indeed the unacknowledged legislators of modern American culture, the only answer to the question is for the guardians themselves to internalize values which will prevent them from abusing their power. The only sensible solution is to inculcate the young scientist with the values and sense of responsibility required to exercise

his profession within a democratic context.

It is fundamentally a problem of education. Given the right civic ethos in the scientific community and proper respect for the spirit of science in the wider society, the specific questions posed by science and technology will fall into place. One such question concerns the use of genetic research to direct man's biological evolution. Another is the use of science to control human aggressiveness. A third deals with the choices science opens to man in the fields of birth control, the prolongation of life, and the development of transplant techniques. This essay will address a specific series of choices posed to American society by the growth of science: namely, in the areas of energy policy and the preservation of our environment. It will offer a possible set of prescriptions for making these choices maximize the creative potentials inherent in both science and American democracy, with the goal of producing a third American century as rich in innovation and human progress as have been the first two.

But the preliminary step required for the humane utilization of these discoveries and techniques is educational and ethical. In short, it is time for the scientific community to develop a code of social responsibility, analogous to the Hippocratic Oath in medicine and to the moral codes of the legal profession, which will govern the social relations of science much as the norms of rationalism and empiricism govern its intellectual decisions. It is an unfortunate historical truth that scientists, so alert in rejecting the claim of authority to prescribe what is true in nature, have been singularly acquiescent to authoritarianism in the political and social spheres. Perhaps the scars of Galileo still haunt scientists; in any case, resistance by scientific spokesmen to political irrationalism, whether in Nazi Germany, Soviet Russia under Stalin, or America in the heyday of McCarthy, was virtually non-existent. Scientists sought refuge in their research laboratories, proclaiming the value-neutrality of science while the external world burned. They failed to resist the application of political repression to their fellow citizens. They even failed to react as a community when their own colleagues were exiled, imprisoned, or discredited.

The attitude of political acquiescence prevented scientists from facing the political, social, and moral consequences of their work. They could affirm the purity of their motives and the extension of knowledge for its own sake, while blaming the negative consequences of scientific progress on corrupt politicians or ignorant electorates. Existentially, it was not a position that could long survive Hiroshima, when scientists first recognized the sin associated with the tree of knowledge. Intellectually, it was a position that failed to realize that the autonomy of science itself was rooted in a specific social order, and that this autonomy had survived largely because of the willingness of non-scientists to fight for a liberal social system.

In developing an appropriate ethos for the next century, the American scientific community must learn the moral and political lessons taught by the Soviet physicist Andrei Sakharov; once content to be showered with official honors as the "father of the Soviet Hydrogen Bomb", his own work led him to the conclusion that scientific progress, world peace, and intellectual freedom will flourish or perish together. In developing and defending this insight, he has performed a notable service not only for his own country but for the scientific community in America as well.

Sakharov and his mentor, Peter Kapitsa, divorced themselves from military research when the implications of the scientific ethos became apparent to them. In this, they took positions analogous to some of the "moralists" in the American community of science who, galvanized by the consequences of Hiroshima or technological warfare

in Vietnam, refused to conduct research which might be employed for morally repugnant ends. These "moralists" represent an antithetical position to that of the "purists", such as Percy Bridgeman or Louis Fieser; the latter disclaim any responsibility for the social consequences of their research and affairs that their only duty is to be "good scientists". If the first position is forthrightly moralistic, the second is forthrightly laissez-faire in the tradition of the capitalist economy with its belief in an invisible hand harmonizing all the activities of the marketplace toward socially beneficial ends. A middle position is probably more in tune with America's specifically democratic heritage: This is the position of the "pluralists". Probably the most rapidly growing tendency within the American scientific community, it is this group which is likely to be more influential in shaping the future scientific ethos. The pluralists see science as one among a series of autonomous social groups, as a profession with a special mission to educate the public, and to provide and interpret for citizens and political leaders the key scientific information necessary for rational policy choices. Currently, many pluralists (as exemplified by Barry Commoner), devote their efforts to clarifying the political and economic consequences of scientific knowledge, sometimes even accepting the role of "adversary scientists" on behalf of public, private, consumer, and environmental groups which are engaged in the democratic political arena. I believe that the hard-nosed expertise of the pluralists, joined to the larger historical vision of men such as Sakharov, can become the foundation for the scientific ethos of America's third century.

A major step in the development of the ethical code must be the recognition of the similarities between the norms of the scientific quest and those of the democratic social order. Both value independence of thought, and demand that theories be given validation empirically (in practice). Both emphasize the toleration of divergent viewpoints as a condition of progress. Both systems, finally, share a respect for human dignity which is at its core egalitarian: The faith that a man's arguments and contributions, not his status, ultimately determine his value to the society. In short, while it is clear that every modern polity needs science, it is even clearer that no political system is inherently more suited to the cultivation of science than the American. The problem is to raise this unity of norms to the level of consciousness and motivation among both scientists and citizens.

Critics of science constantly charge it with fostering a corrosive skepticism which undermines moral values and political institutions. It would be useless to deny that science has put to question some of the beliefs and values which America's founding fathers brought from Europe. The community of America in the next century will certainly not be the automatically given community of the past. After Watergate and Vietnam, it is apparent that it can only be a community in which public confidence is won by the spirit of truth and openness. In other words, it is necessary to make visible the "invisible hand" which in the past has kept the American political system together.

No mere mechanical arrangement of market forces or electoral arrangements could be sufficient to contain the centrifugal tendencies of utterly selfish individuals and groups. In reality, what kept the system from flying apart in the past was the subconscious commitment of its members to honesty, to respect for each other's freedom and well-being, to a basic patriotism. It is these same values which must now be made conscious to the various segments of the American community. A recognition of our real interdependence and mutual well-being is necessary in order to justify the sacrifices which any society periodically requires of its members. A realization of how this interdependence and well-being is fostered by the spirit of science and democracy can be the cement of the new social order in America's

third century. Thus, the American community of the future, while in many respects departing from traditional values, can still remain a community of freely-chosen ends and rational, consensual means.

Of course, this is not a metaphysical postulate or a utopia built in air. It is necessary to show how the concrete issues facing America today require this framework, and the practical consequences which such a framework will exert on the resolution of those issues. For this purpose, we turn to an analysis of the crucial issues of energy and environmental policy. Often regarded as opposed in their conclusions, their fundamental unity comes to light in the perspective of the ethical and philosophical framework outlined above.

Thereis no more critical example of the influence of science and technology on the determination of our values than the present national energy struggle. Energy availability exerts enormous control over our mobility, over our flexibility regarding disposal income and consumer choices, and over our psychological stability. This last consideration, one of the least examined, is potentially one of the most lethal. Indeed, what will people do when their previously unlimited personal mobility no longer presents a readily available escape route for avoiding the problems of the community, the family, and finally, the self?

A second, similarly dislocating effect of limited energy availability is the impact it has had and increasingly will have on our nation's growth ethic. The existing ethic of relatively unlimited growth has been represented traditionally by the equation, "growth equals goodness". Now the energy-created necessity of limited growth refutes that equation; the need to limit growth pervades every facet of American life from the size of the federal budget to the size of our food bill. This pervasive impace will remain as an inexorable reminder for the future, regardless of our willingness to recognize it and to plan for it. Now, replacement or replenishment of existing operations will command as much, if not more, energy priority than expansion. Now, every growth proposal, for reasons of national self-interest, must first answer the question, "Can the project's energy needs be met?" Governments must ask this question when they propose new public facilities, be they houses or hospitals. Businesses must deal with the question when they seek to satisfy new markets or simply to serve the old ones. And families will face this question when they contemplate an addition to the house or to the family.

Yet, while all people share in the creation of this energy crisis, it would be naive to think they share similarly the will or the way to solve the problem. One cannot deny the mid-twentieth century eclipse of our momentous tradition when measured by examining theory in the light of practice. Ours has beome a nation in which a minority of policy-makers decide directions for the majority, while that majority seemingly accedes with apathy. And while this trend must be modified, the reality is that energy solutions in the next century will emerge from the minds of the few, yet depend upon the efforts of the many. It is on this paradoxical relationship between the few and the many that our hopes for the Third Century will hinge.

But is it sensible to speak of "solving" the energy problem? Or more important yet, is a discussion of solutions for the energy problem consonant with the equally critical need for preserving our unique natural resources and an appropriate standard of environmental quality? Inevitably, there will be a struggle between energy needs and environmental safeguards. However, the race between those who propose, "energy at all costs", and those who cry, "environment without compromise", will not be won by either group. Similarly, that race will not be won, in any permanent sense, by nineteenth century nationalistic notions of

"the rich, the strong, or the wellborn". In fact, if there is to be a victor in the struggle, the winner will be that coalition of concerned citizens which possesses the persuasion, and therefore, the power to discipline themselves to accept a precarious balance between energy and environment. In the language of the nineteen seventies, the ailing nation needs a "power-broker" for the Third Century; a person who understand the psychological power of committed people and the physical power of energy to serve these people.

The basic premise behind this prescription for improvement is the belief that existing policy mechanisms have proven only partially adequate. This inadequacy suggests the need for evolving a new policy orientation synthesizing the best of the new. Such a synthesis means exposing all public policies, regardless of past reverence, to a fresh reassessment. Essential to this reevaluation must be a willingness to examine any feasible approach regardless of ideological preconceptions which may have encumbered that idea in the past.

If "synthesis" can imply a process of combining differing points of view, then it is the spirit of this combination which must usher in our "Third Century". For example, the first step in a new policy orientation for solving societal energy problems might be to integrate the traditionally conservative notion of "citizen voluntarism" with its conventional opposite, "central governmental assistance". Too often, policy-makers have become paralyzed by the political aspects of ideological purity, preventing a working relationship between voluntarism and governmental assistance.

Clearly, governmental involvement on some issues has been extended beyond its functional limits to counterproduction and duplication. These excesses must be eliminated without exception and replaced by a rebirth of citizen voluntarism with individuals and communities caring reciprocally by choice, rather than by force. The "free ride" in America, never really free, must now reflect the society's true costs. When necessary though, central governmental assistance must be available to meet those needs of the society which would be ignored or relegated to a low priority if denied central support. In this context, a fresh look at private sector activity is necessary, as well as a reexamination of those assisted functions already part of the public sector.

Increasingly, the recent history of this nation reveals an alarmingly self-destructive nature in the public and private sectors. While both sectors are plagued by increasing energy costs and environmental needs, neither sector demonstrates the skill of conciliation necessary to unify the two factions for a sustained attack on common problems. Historically, when both sectors are forced to combine, the problem which prompted the combination often has already expanded beyond the scope of any meaningful control. Must this be standard procedure in the Third Century?

The energy-environmental conflict in the Third Century could be the first massive test of broad-based public and private sector cooperation. Realistically, the nation will have no positive alternative to this cooperation. Moreover, inasmuch as both sectors are known to have thecapacity to cooperate, the real test in the future will be whether they have the will to cooperate; that is, the commitment for critical compromise so deficient in our recent history.

The public sector could assume the lead initially by voluntarily instituting ethics codes for Public Service Commissioners, by monitoring mechanisms for public planning, and by more reasonable explanations for political appointments. An initial effort of this sort might encourage the private sector to respond reciprocally by sharing the cost of guarantees for public bonds, by developing new methods for

computing customers' energy costs, and by reassessing the industrial posture toward environmental suits and the need for tax subsidies. While these examples are merely illustrative, the possibilities for additional cooperation are nearly limitless. Together, both sectors could capitalize on an "era of good feeling" to seek agreement on timetables for environmental standards, to share responsibility for coercing energy conservation, and to begin meaningful waste recycling.

Each of the suggestions mentioned in the previous paragraph could be operationalized either immediately or within the next decade. Insofar as this kind of cooperation begins to gather momentum, more ambitious interaction might be attempted. In the spirit of compromise, private industry might agree to permit the public creation of a unified energy import and transport agency, responsible for handing the purchase and delivery of foreign oil. Upon arrival in America, this oil could revert to the private sector for refining and distribution. Obviously, the economic efficiencies which public unification might provide, could benefit the private sector as well, allowing that sector time and funds for desperately needed domestic energy exploration. Additional sector cooperation may be possible in the areas of energy data collection, job retraining, and stock-option purchases for workers in the energy industry. None of the above need be pursued unilaterally. Each suggestion offers potential benefits for each sector and, in most illustrations, there are benefits for the individual citizen as worker and as consumer.

If there is one urgent theme of commonality which should operate throughout the Third Century, it is perhaps that the private and public sectors must cooperate on the urgent matter of energy conservation. The private sector has demonstrated remarkable improvement in this dimension in the last five years. Their motive has been largely economic; to avoid the soaring costs of new energy; and to enjoy the profits of forcing energy to serve multiple purposes in resource recovery as well as output. Unfortunately, these savings do not extend throughout the private industrial sector; indeed the bulk of energy waste continues to be in this sector. The public sector cannot be exonerated from this charge either, even though its energy waste is smaller quantitatively. In fact, the public sector is more of a threat nationally because governmental units have not demonstrated adequately the discipline or the creativity of the private sector. The combined inadequacy of both sectors has produced a national rating of fifteenth position in world energy savings for 1974; a most disappointing reality for the best educated nation on the earth.

Grasping the start reality of our present position has proven an elusive task. The national failure to understand the inextricable interrelationship of energy needs and environmental quality threatens our existence each day. The apparent national energy complacency with which this Second Century concludes must be replaced in the Third Century by a genuine acceptance of alternative energy exploration as a key priority. The preceding statement is not casually constructed. Successful treatment of issues such as foreign aid, space exploration, and nuclear disarmament are fundamentally dependent upon finding an appropriate resolution of the energy-environment conflict; the converse of this statement is true as well. Foreign aid, in the form of fair prices for natural resources and increased technical assistance, may determine the feasibility of creating a climate of international energy cooperation. Space exploration may produce new methods of transportation, as well as new notions for closed-system energy usage and food preparation.

Nuclear disarmament, at first glance, seems unrelated to energy resource matters. Indeed, on the threshold of the Third Century, nuclear disarmament may seem utopian. In fact, it might be quite realistic. Inasmuch as a nuclear war and the destruction of the ozone shield would effectively eradicate necessary vegetation, any standard of environmental quality must render such a war totally intolerable. Consequently,

there must be an alternative. The Strategic Arms Limitation Talks may be one incremental step toward that alternative. Nuclear disarmament would help defuse international tension. The savings realized from reduced arms expenditures could infuse the energy development field with the funds so critically needed to operationalize nuclear power.

With a time period of one hundred years, and sufficient motivation and necessity, it is reasonable to suggest that this nation could satisfy the challenges of peace and energy. If this objective is not realized in the Third Century, one must wonder whether a Fourth Century is tenable.

ENERGY AND GROWTH IN THE PACIFIC NORTHWEST

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Projects in Citizen Awareness

The Institute for Environmental Studies at the University of Washington and the Washington State Energy Office are currently involved in several media projects aimed at informing Pacific Northwest citizens about energy development issues.

The projects, loosely titled ENERGY AND GROWTH IN THE PACIFIC NORTHWEST, operate under the direction of Dr. James Crutchfield, Professor of Economics at the University of Washington, and former chairman of the Washington State Energy Policy Council, and Dr. Kai N. Lee, Assistant Professor of Environmental Studies and Political Science, also at the University of Washington. Work is funded by a grant from the Office of Education, U. S. Department of Health, Education, and Welfare. The projects are also supported with in-kind services and spiritual support from the University of Washington, the Washington State Energy Office, and the commercial and public television and radio stations in the various northwest media markets.

The northwest has several unique energy problems. The most important, but least understood, is that relating to the Bonneville Power Administrations' Hydro-Thermal Power Plan. Nearing the close of a long and fruitful development of its hydro-electric generating resources, this region is now moving toward a major commitment to nuclear electric energy. In the next three decades the electrical generating capacity of the region may double or triple. Plans now envisage the construction and operation of up to thirty nuclear power plants by the year 2000.

Each of these plants will cost well over one billion dollars (1975 dollars) to build. It is not clear where the money for this mammoth capital program will come from. It is not clear what effect it will have on the capital needs in the other sectors of the northwest economy. This increase in energy capacity will undoubtedly have a profound impact on the industrial and social makeup of the region. Therefore, it is essential that decision-makers and the public reach a consensus on what this region should look like in twenty-five years.

We hope that the information presented in our project will serve as a catalyst for such a debate.

We are also concerned with the problem of oil tankers on Washington's inland waters. The development of petroleum reserves on the North Slope of Alaska is likely to bring vastly expanded shipments of crude oil to northwest ports. The environmental, economic, and industrial implications of a massive oil economy are already the subject of a keen, and sometimes angry, debate.

Although anxious energy suppliers, wary environmentalists, and worried public officials are aware of the scope of the policies under discussion, the general public - and some of their representatives in government - remain poorly informed and minimally involved. These less than optimal conditions for social choice reflect both inadequate information availability, and political and social factors among the

citizenry.

Our project is aimed at changing the information availability so that broad public involvement, however deliberate or informed, at least need not be constrained by lack of unbiased data.

To do this, our project disseminates energy information through three major outlets: public service announcements; background reports for journalists; and television documentaries.

Commercial television stations are contributing production services for a series of public service announcements for airing on regional television stations. These PSA's emphasize basic energy information (e.g., dollars saved in car pooling) and energy conservation techniques (e.g., how to caulk, insulate, etc.). The approach is always direct: you can save energy and save money!

To date nine spots have been produced and aired in the major northwest markets: Seattle, Portland, Spokane, Tacoma, and Bellingham. The spots are carried by cable link to other smaller markets.

Few journalists have the time or the training to research thoroughly all aspects of "energy crisis" stories that they face almost daily. A second aspect of our project involves the production of a series of background papers for members of the working press, both electronic and newspaper/magazine. These papers are developed by the project staff with the assistance of faculty at the University of Washington and, when appropriate, from industry and government. The papers usually are short (3-6 pages). They try to summarize relevant technical, economic, and social data on specific energy problems (e.g., natural gas as a factor in U. S. Canadian relations, the effects of energy conservation on unemployment, etc.).

The project has also been involved in the production of two longer (30/60 minutes) documentaries on matters of regional importance (i.e., oil on Puget Sound, regional electricity supply and demand, etc.). These programs have been broadcast in prime time on commercial and public television stations throughout the region.

The task at hand is basically one of translation of technical information to an audience that is not necessarily familiar with the technical language. All material prepared by the staff is reviewed by a faculty steering committee to insure that an accurate, understandable "translation" occurs.

We have been encouraged by recent reaction to these programs. The Washington Energy Office is coordinating much of its public information work with our programs. The WEO has also assigned a full-time staff person to work on the grant project. The Federal Energy Administration and the Energy Research and Development Administration have offered research assistance and staff time.

The utilities and other energy companies have shown great interest in this project. They have been most cooperative in providing access to information and technical expertise. Several have even paid for additional printings or our background papers for distribution within their organizations. In view of the fact that it is important to maintain a regional awareness, we continue to work closely with the Governor's Energy Task Force for the State of Washington, as well as with the Oregon State Energy Office.

Questions of the effectiveness of this program remain to be answered. We are in the process of developing a method and model designed to ascertain, more specifically the impact these programs have on the community as a whole and the members of the

media in particular.

We are also working with the faculty of the Communications Research Center at the University of Washington on the specific problems encountered in communicating complex information that often runs counter to an audience's expectations. People, of course, employ selective perception in hearing what they want to hear. However, using the response received to date as one measure of effectiveness, it may be concluded that there is a rising awareness of energy use problems in the Pacific Northwest.

Our first demonstration year has only strengthened the commitment to the communication and public service goals of this project:

- To promote the public understanding of the scientific, technical, economic, environmental and social implications of region-wide energy planning.
- To improve the University of Washington's capability to communicate the results of technical, policy-oriented research to a broad audience.
- To address the pragmatic communications problems of formulating policy-related research into a form that is useful to citizens and policy makers.
- To strengthen the working relationship between the University and the northwest region's media organizations.
- To contribute to the citizen participation process.

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ENERGY CONSERVATION AND CHANGING LIFE STYLES

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In the last few months, it has become apparent that many Americans no longer believe that energy conservation is either necesszry or desirable. The most obvious manifestation of this is the significant drop in the ratio of compact cars to larger-sized models. Other indicators of decreasing concern are the rise in sales of motor homes, and the sharp drop in television and newspaper advertising exhorting us to conserve energy.

Is energy conservation necessary? Is it desirable? These are the two questions I would like to explore in this paper. Of the two questions, the first is relatively (but only relatively!) straightforward. The question of the desirability of energy conservation leads us quickly to the quagmire of value related issues, and I can hardly deal with them adequately in the limited space available here. There is no denying that a drastic cut-back in energy use will require substantial changes in life styles. The point I shall try to make later on is that considerable energy savings are attainable even without dramatic life style changes.

Is Energy Conservation Necessary?

The general energy-supply problem in the USA is well known, so I'll touch on it only briefly. The two largest sources of energy in the USA at present -- petroleum and natural gas -- are in short supply. Most geologists feel that domestic production of both these fuels has already peaked out, and will keep on declining in spite of occasional new discoveries. Any increase in our consumption of these two fuels will have to be met by imports. We are already paying about $25 billion a year for oil imports, and larger imports of fuels will mean either a further loss of jobs to the economy, or additional exports to the oil-producing countries, much of it in the form of sophisticated weapons of destruction. Not only is this questionable morally, but the dangers of increasing the military capabilities in a volatile part of the world should not be underestimated. Further, additional imports of oil and gas would make the U. S. economy even more vulnerable to disruption.

The domestic sources on which we are counting for "Energy Independence" are, at least for the next couple of decades, coal and uranium. The environmental problems associated with each of these sources are substantial. The recent mine disasters in Kentucky are a reminder of some of the hazards in the deep mining of coal. Death due to "Black Lung" is another price many coal miners pay to provide us with the electricity we require. The least we can do is to make sure that we do not use it frivolously. Surface mining of coal has other problems, such as oil erosion, and contamination of streams and rivers. It is well known that when we burn coal we put sulfur oxides and particulates into the air, as well as dump the heat in air or water. One hears less often about the carbon dioxide produced when coal, or any other fossil fuel, is burned, since we don't normally think of carbon dioxide as harmful to us. However, many scientists believe that a doubling of carbon dioxide concentrations in the atmosphere could raise the average temperature of the world by about 2°C. This may not seem

like much, but it is enough to melt part of the polar icecap, raise the level of the oceans, and significantly change the climate of the world. Few of us consider this the ideal solution to the world's exploding population.

The problems of nuclear power have also become widely known. The ones that I feel most concerned about are more of a sociological than a technological nature -- the possibility of a sabotage of a reactor or plutonium reprocessing facility by a terrorist group, the dangers of world-wide proliferation of nuclear reactors followed by nuclear weapons, possible theft of plutonium or a nuclear weapon and its uses for blackmail, and the need to safeguard highly radioactive materials for tens of thousands of years.

A modern, industrial society like the USA needs substantial amounts of energy, much of it in the form of electricity. I am not recommending a return to the "Good Old Days" because I do not think they ever existed -- at least not for the majority of a population. What I am suggesting is that we examine whether, given the conditions prevailing in the Bicentennial year of 1976, we can benefit more from conservation, or from building more power plants. (Incidentally, let us also keep in mind that building more power plants is not going to reduce our oil imports very much, since most of the oil is used in the transportation sector, and the electric automobile is a long way from mass-production and use.)

Economists tell us that we should do a cost-benefit analysis. One problem with many such analyses is that whereas the benefits can be stated in dollars (such as increase in GNP), the health and environmental costs are much more difficult to quantify. Another problem with cost-benefit analyses is that, frequently, the people getting the benefits are very different from those paying the costs. Very few directors of electric utilities choose to live a mile downwind from their power plants! The group paying the costs is often unaware, poorly organized, and not very vocal. This is especially the case in doing a cost-benefit comparison of increasing energy use versus conservation. The benefits accrue fairly rapidly, and mainly to people of middle age, but most of the costs will be borne by those still very young and the least vocal group of all -- the generations still unborn.

As Emile Benoit (1) has stated:

> "Our era will probably be viewed in future as somewhat obsessed with the issue of equality. The struggle of various disadvantaged groups to obtain greater equality, and of other groups to resist it, forms the core of modern politics. And even international relations sometimes seems like the class struggle writ large."
>
> "Yet our concern for equality so far is quite uni-dimensional; it is limited to 'interspatial equality', the equality of those in different places at the same time. Hardly a thought is given to what I call 'intertemporal equality', equality between people living at different times -- specifically between ourselves and future generations."
>
> "Do we have the right to exhaust the resources that future generations will need? Are we justified in raising the temperature so high that they will have to curtail their use of energy to escape extinction? Is "Apres moi le deluge" any more acceptable as a way of life for a whole generation than it is for a single tyrant?"
>
> "Granting that posterity has, as yet, done nothing for us, and that it casts no votes, does that free us to ignore them? Are we not,

through the efforts of our forefathers, the inheritors of an elaborate and rewarding civilization -- most of which we did not and could not have built ourselves? And does not this put us, willy-nilly, in the position of trustees for the welfare of future generations? Moreover, aside from such moralistic considerations, do we not feel instinctively a certain basic loyalty to help preserve our own species?

Not only does energy conservation make sense from a long-term point of view, but it can also have a greater impact in a shorter period of time. Building electric power plants can take between five and eight years; developing a new oil field offshore almost equally long. Conservation, on the other hand, can pay off practically at once.

Will Energy Conservation Result in Economic Decline?

There is a widespread feeling that energy conservation will result in economic disruption and a lowering of the "Standard of Living". Support for this view is frequently based on the correlation between the Gross National Product (GNP) per capita and energy consumption per capita. Recent data for several countries are plotted in Fig. 1. It is clear from the figure that the USA and Canada not only have very high levels of energy consumption compared to the United Kingdom, Italy, Brazil, and India, but also have an almost proportionately higher Gross Domestic Product (GDP) (GNP corrected for imports and exports) per person. A more interesting feature of Fig. 1, though, is that both Sweden and Switzerland now have a slightly higher GDP per capita than the USA, but use only 50% and 35% as much energy per person, respectively, as this country. The Federal Republic of Germany has a per capita GDP only slightly lower than the USA, whereas its energy consumption per person is only about one half that of an average American.

In Fig. 2, I have drawn the GDP per unit of energy consumption for the USA, West Germany, Sweden, and Switzerland. This ratio can be considered to be an indication of the efficiency with which different countries utilize energy for their economic output. Among these "rich" countries, the USA is by far the least efficient in its use of energy. It is sometimes argued that comparisons with Switzerland or Sweden are misleading, because these countries have very small populations and other special circumstances. We shall, consequently, restrict our comparison to West Germany, which has a large population (almost 60 million), and a diversified industrial economy. Fortunately, the Federal Energy Administration has recently issued a report prepared by the Stanford Research Institute comparing the energy consumption between West Germany and the USA (3). The use of energy in households and commercial establishments, industry, and transportation are compared in Table 1.

Table 1. Energy Consumption per Capita in West Germany as a Percent of that in the United States - 1972

Sector	% of US Consumption
Households and Commercial	52.1
Industry	60.8
Transportation	25.7

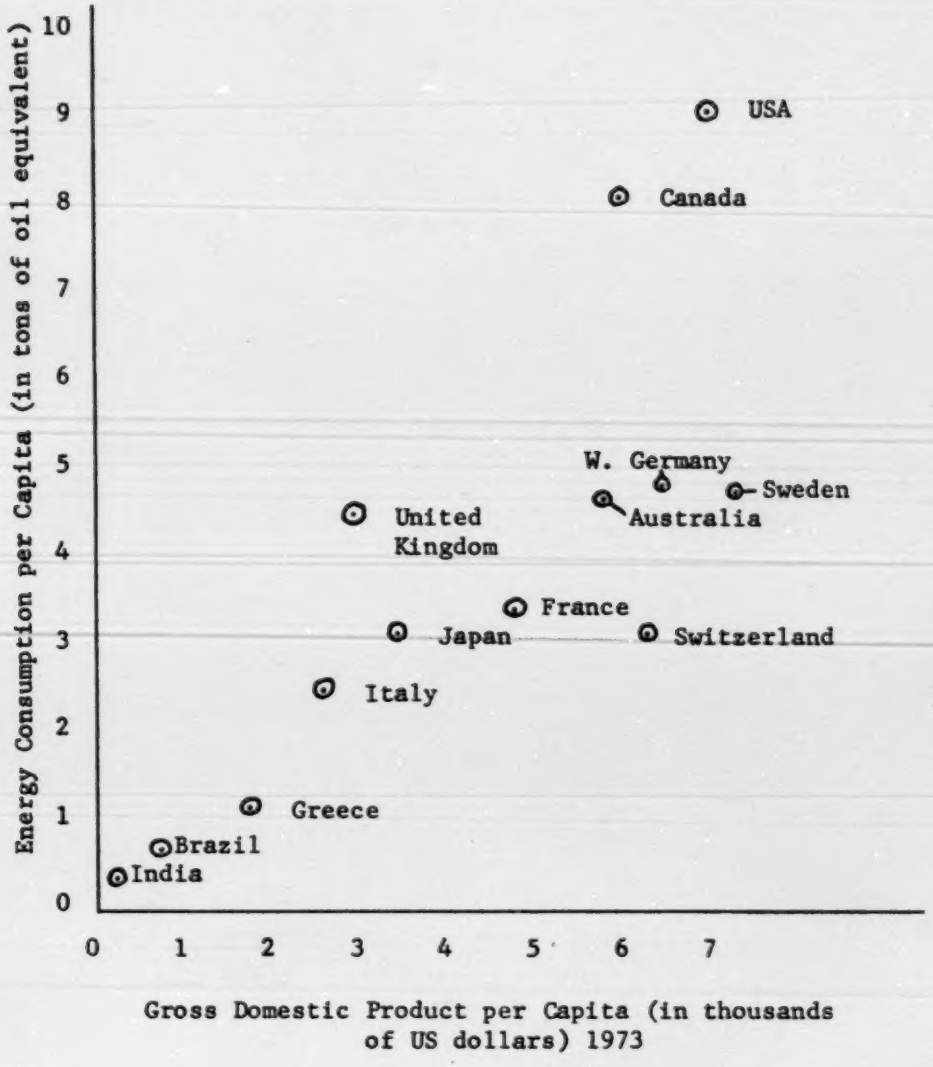

FIG. 1. Energy Consumption and GDP per Capita in Selected Countries. (Source: OECD, Ref. 2, except for Brazil and India, which have been estimated by the author. All figures are for 1973.)

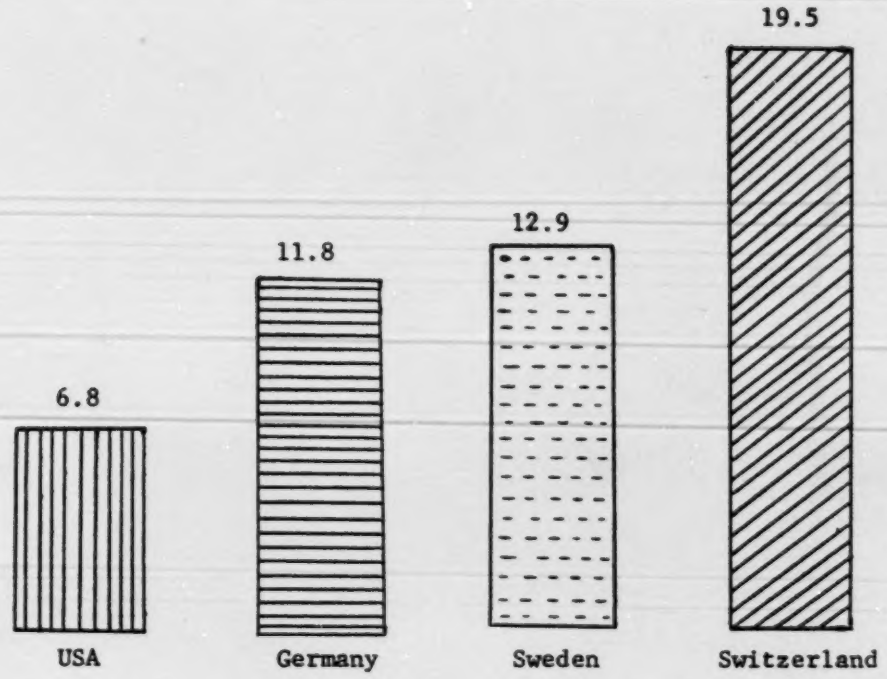

Fig. 2. Ratio of Gross Domestic Product (GDP) to Energy Use. (Hundreds of US dollars per ton of oil equivalent.)

Not surprisingly, the country that gave us the "Beetle" and the "Rabbit" has a much more energy-efficient transportation sector. In addition to better mileage for passenger vehicles, the other big factor is the lower amount of both passenger travel and freight transport. By and large, Germans live closer to work, and freight is transported between cities that are nearer to each other than American cities. We cannot very well move Atlanta closer to New York (and maybe you would not want to), but it is possible to design communities where people live closer to work. Another factor that contributes to energy conservation in transportation in West Germany is that the Germans travel only 13% as many passenger miles by air, and 46% as many by road as their US counterparts, whereas, they travel ten times as many passenger miles by rail.

In the industrial sector, the US consumes about 40% more energy in relation to output than West Germany. This is true whether we measure the output in terms of

the dollar value of shipments or the number of tons of various products manufactured. An important factor in this saying is the large amount of total electricity (28%, compared to less than 6% in the USA) generated by industrial establishments, which permits much of the heat discharged from the generators to be used directly.

Finally, in the residential/commercial sector also, the West Germans use considerably less energy in almost every category than we do. Table 2 compares the residential use of energy per person in the two countries.

Table 2. Comparison of Residential Energy Use per Capita in the United States and West Germany - 1972

	West Germany as Percent of United States
Space Heating	67
Hot Water	37
Cooking	60
Air Conditioning	1
Clothes Drying	1
Other	18
All uses, excluding space heating	26
All uses	48

Source: Federal Energy Administration - Ref. 2.

If space heating is excluded, the residential energy use per capita is only one-quarter that in the USA! This is in spite of the fact that the percentage of households with various electrical appliances are about the same in West Germany as in the USA, except for air conditioning (which they seldom need), clothes dryers, and dishwashers. Water heating in West Germany is usually from small point-of-use systems -- with water being heated only when it is needed. Space heating in that country actually uses only about one-half as much energy as in the USA, if the colder weather is taken into account. There are two main reasons for this:

1. Residences in the USA have, on average, 57% more floor space than those in West Germany.

2. Only 45% of the dwelling space in West Germany is heated.

I have discussed this comparison at some length because it provides suggestions on ways of conserving energy without undue hardship. Having lived as a graduate student in West Germany for five years, and having visited it several times subsequently, I am inclined to agree that there is very little difference in the economic affluence of the people living in the two countries, in spite of the fact that their per capita energy use is only half that of the average American. My remarks will not, I hope, be interpreted to mean that the US should become just like West Germany! The world will become a very dull place if all countries looked alike, and I view with increasing concern the growth of concrete-and-glass structures and urban sprawl on all the continents. The unique flavor of each country depends on its people, landscape, language, food, music, architecture, poetry, art, theater, and the like. I do not think we need to feel ashamed in learning to use resources more wisely and efficiently. On the contrary, there are greater

moral problems (as well as longer-term practical problems) in the US consuming about a third of the world's diminishing mineral resources.

The point that needs to be emphasized here is that if we use energy as efficiently, say, as the West Germans, we could keep on increasing our economic affluence at a rate of about 3% per year for the next 15 years, without the need for using any more energy!

Devising Energy-Conservation Strategies

We have seen in the preceding discussion that the areas in which major potential for conserving energy exists are transportation, space heating and cooling, and industrial process heat. Let us look briefly at the measures that could be taken in each of these areas.

Transportation

About a quarter of the total energy used in the USA goes for transportation, and most of it is in the form of petroleum. Consequently, the need for conservation in this category is very acute. A recent study by Eric Hirst (4) has compared four alternate policies in terms of potential energy savings by 1980 and 1985. The policies and the estimated energy savings are shown in Table 3.

Table 3. Energy Impact of Transportation Conservation Measures

Policy	Estimated Energy Savings (thousands barrels per day)	
	1980	1985
Increase percentage of urban travel carried by mass transit from 2.5% in 1973 to 5.0% in 1980 and 7.5% in 1985	52	122
Increase carpooling sufficiently to reduce work-trip auto travel by 10% in 1980 and 1985	69	105
Increase gasoline prices by 20% starting in 1975	484	700
Increase new car fuel economy from 14 mpg in 1974 to 20 mpg in 1980 and 22 mpg in 1985	568	1327

Source: Eric Hirst - Ref. 3.

For enthusiasts of mass-transit and carpooling, it is disturbing to see that, in the next ten years at least, considerably more energy could be saved by increasing new car fuel economy, and by a 20% rise in gasoline prices. A main reason why increased use of mass-transit has comparatively small impact in the short-term is because only 2.5% of total urban passenger travel is by this mode. If we keep neglecting it for that reason, the potentially large longer-term savings will obviously never be realized. Carpooling can also be promoted, but will require somewhat greater changes in our habits. Another way in which we can help reduce energy use in transportation is by making places of work and their surroundings attractive

enough for people to be willing to live close to them. After all, very few of us enjoy commuting an hour in each direction.

Space Heating and Cooling

Almost a sixth of the total energy consumption in the USA is for space heating and cooling in homes and offices. Considerable savings are possible by simply using better insulation. Adding only one inch of insulation to the ceiling and walls of a previously uninsulated house in this region can result in energy savings of about 45%. Each subsequent inch, of course, saves much less, but it is possible to save about 53% of the energy use of an uninsulated house by putting four inches of insulation in the ceilings and walls (5). In addition, if a house has a window with only a single layer of glass, the addition of a storm window can reduce the total heating and cooling bill by 10%. Weather-stripping and caulking can also make a substantial contribution to energy conservation.

Uniform building codes could be designed to optimize the use of insulation in new buildings, and when possible in older ones as well. The use of storm windows and weather-stripping could be mandated. Shortage of time prevents the discussion of other measures that could conserve energy, and that could be included in building codes.

Another contribution that can be made to energy conservation is by encouraging people to live in multi-family dwellings. Even if the apartments have the same surface areas as individual homes, the higher ratio of volume to surface area reduces heat loss to the outside. Apartment-living also cuts down on urban sprawl, and consequently on energy use for transportation as well.

Industrial Process Heat

A significant fraction of the process heat required by industry could be provided much more efficiently by a combined electricity and heat system, than by electricity produced at a remote location and transmitted to the industrial plant. Metropolitan areas with large industrial centers could encourage industry to experiment with this approach to reducing energy consumption.

I have only picked on three important areas in which sizable energy savings are possible. These do not, by any means, exhaust the range of energy conservation opportunities that we have. I have intentionally left to the last the very important role of educational institutions. The major obstacles to energy conservation, in my view, are the prevalent opinions that:

1. We do not really need to conserve energy any more.

2. Energy conservation will worsen our economic problems, and reduce our economic affluence.

3. Conserving energy means a return to the life styles of our great-grandfathers.

These myths can only be dispelled by the efforts of educators at all levels. In a course on "Energy, Environment, and the Quality of Life", which I teach at Indiana University, the students are asked to draw up their total energy-budget for the preceding year. They are then asked to reduce this total by 20%, and examine the extent to which their life styles would be affected by the cut. A vast majority of them are considerably surprised to find that they can cut this amount of energy without any undue hardship or deterioration in their "Quality

of Life". They had simply been unaware of how wasteful they were, and how easy it was to conserve energy!

Thanks to the work of educators, awareness of the need for energy conservation is likely to rise. Not very long ago, you may have heard the remark "The problem with the future is that it is no longer what it used to be!" In the area of energy conservation, at least, that should be reason for hope!

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